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ABSTRACT

In their study of driver education practices, the authors investigated the relative effectiveness of four selected driver and traffic safety education laboratory programs, three selected driver and traffic safety education classroom programs, and sought to determine if the effectiveness of a program is affected by the sex of the student. The experimental population was pretested, exposed to the various programs under study, and then tested for driving performance, driving knowledge, and traffic analysis. The results of analysis of data obtained in the study suggests that certain practices and methods may be more efficient than others and that there is a sex differential in driver knowledge. Included in the appendices are a bibliography, a sample of the various lesson plans and teaching methods, and information on the research methodology. (JY)

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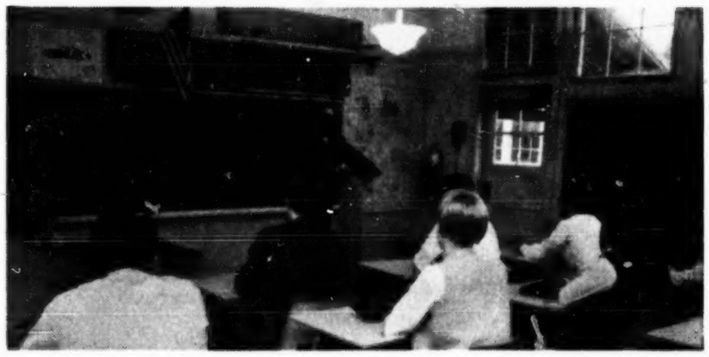

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WASHINGTON DRIVER AND TRAFFIC SAFETY EDUCATION PROJECT

A Study of the Relative Effectiveness of Selected Laboratory and Classroom Programs in Driver and Traffic Safety Education

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Olympia, Washington

August 1969

A STUDY TO COMPARE THE RELATIVE EFFECTIVENESS OF SELECTED LABORATORY AND CLASSROOM PROGRAMS IN DRIVER AND TRAFFIC SAFETY EDUCATION

An Abstract of a Dissertation
Presented to
the Faculty of the Graduate School
Michigan State University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

by
Charles E. McDaniel
October 1969

Abstract

ABSTRACT

A STUDY TO COMPARE THE RELATIVE EFFECTIVENESS OF SELECTED LABORATORY AND CLASSROOM PROGRAMS IN DRIVER AND TRAFFIC SAFETY EDUCATION

by Charles E. McDaniel

Statement of the Problem

The purposes of this investigation are:

1. To compare the relative effectiveness of four selected driver and traffic safety education laboratory programs - standard, simulator, range, and four phase;
2. To compare the relative effectiveness of three selected driver and traffic safety education classroom programs - thirty hour classroom instruction, thirty hour classroom instruction plus fifteen hours drivocator instruction, and forty-five hours classroom instruction; and
3. To determine whether the relative effectiveness of the laboratory and classroom programs is different for female or male students.

Methods and Procedures

The largest high school in the state was selected for the study, thus providing for an adequate study sample of eight hundred and one usable sets of student records. Students were assigned randomly to the twelve instructional treatment groups. Precautions were taken to assure that no one phase of instruction or instructional treatment group would receive superior or inferior instruction.

Criterion Measures

The criterion measures used to evaluate student performance were divided into three areas: driving knowledge, driving performance, and traffic analysis.

Analysis of Data

The following statistical treatments were applied to the data:

1. A three-way factorial (4 × 3 × 2) unweighted means analysis of variance was applied to each of the six criterion variables to test the basic hypothesis.
2. Scheffé's Test for Multiple Comparisons was applied in those instances where analysis of variance resulted in an F-value significant at the level equal to or less than .05.
3. Chi-square was used to determine whether the frequency of rejection on the Road Test differed significantly among the four laboratory programs, among the three classroom programs, and between the sexes.
4. Chi-square was used to test the hypotheses regarding the relative number of rejects and the proportion of pass versus fail which were made by students on the McGlade Road Test.
5. The Pearson Product-Moment Coefficient of Correlation was computed to determine whether a relationship existed between the study population's scores on the criterion measures.
6. A t-test was employed to determine if a significant gain in mean scores from Pre-Test to Post-Test for Driving Knowledge existed within any of the three classroom programs, four laboratory programs, female students, or male students.

Summary of Findings

The following is a summary of the findings where significant differences were found:

1. There was a significant gain in the mean scores from the Pre-Test for Driving Knowledge to the Post-Test for Driving Knowledge attained by students assigned to the four laboratory programs, the three classroom programs, female students, and male students.

2. On the Post-Test for Driving Performance, a significant difference at the .05 level of confidence existed among the mean deduction scores attained by students assigned to the four laboratory programs. Multiple comparisons revealed that students assigned to a simulator program had significantly (.05) higher deduction scores than a combination of a standard program and a range program. A significant difference at the .10 level of confidence existed between the mean deduction scores attained by students assigned to a standard program and a simulator program, in favor of the standard program.
3. On the Post-Test for Driving Performance - Part I, a significant difference at the .05 level of confidence existed between the mean scores attained by students assigned to a standard program and a simulator program, in favor of the standard program.
4. On the Post-Test for Driving Knowledge, a significant difference at the .01 level of confidence existed among the mean scores attained by students assigned to the three classroom programs. Multiple comparisons were unable to isolate any significance at the .01 level, but significance at the .05 level of confidence existed between the mean scores attained by students assigned to a thirty hour classroom plus fifteen hour drivocator program and a forty-five hour classroom program, in favor of the thirty hour classroom plus fifteen hour drivocator program.
5. On the Post-Test for Traffic Analysis, no significant differences at the .05 level existed among the mean scores attained by students assigned to the three classroom programs. However, significance

was found at the .10 level of confidence between the thirty hour classroom plus fifteen hour drivocator program and the forty-five hour classroom program in favor of the thirty hour classroom plus fifteen hour drivocator program.

6. On the Post-Test for Driving Knowledge, Post-Test for Driving Performance - Total, Post-Test for Driving Performance - Part I, and Post-Test for Driving Performance - Part II, a significant difference at the .001 level of confidence existed between the mean scores attained by female and male students, in favor of the male students.
7. On the Post-Test for Driving Performance - Total, a significant difference at the .01 level of confidence existed between the rejection rates and failure rates of female and male students taking the McGlade Road Test, with the female students having a higher frequency of rejection and failure than the male students. Further analysis suggested that no significant classroom X sex or laboratory X sex interactions exist.
8. On the Post-Test for Traffic Analysis, a significant difference at the .025 level of confidence existed between the mean scores attained by female and male students, with the female students having a higher mean score than the male students.

There were no interactions among the factors in the analysis, although a three-way interaction between laboratory, classroom and sex approached significance at the .05 level of confidence on the Post-Test for Driving Knowledge and the Post-Test for Driving Performance. However, on the supplemental analysis of the Post-Test for Driving Knowledge, after eliminating the five extreme scores, significance at the .05 level of confidence did exist both in the two-way interaction between classroom and sex and in the three-way interaction between laboratory, classroom and sex.

The coefficients of intercorrelation among the six criterion measures were significant at the .05 level of confidence or higher except for the following: Post-Test for Driving Performance - Part II vs. Pre-Test for Driving Knowledge, Post-Test for Driving Performance - Part II vs. Post-Test for Driving Knowledge, and Post-Test for Traffic Analysis vs. Post-Test for Driving Performance - Part I.

An expected high correlation resulted between each part score and the total score on the Post-Test for Driving Performance. The low correlation between the two parts of the Post-Test for Driving Performance is an indication that the two parts measure different components of the driving task.

A low correlation resulted between the Post-Tests for Driving Performance and the Pre- and Post-Tests for Driving Knowledge. A low correlation also existed between the Post-Test for Traffic Analysis and the Pre- and Post-Tests for Driving Knowledge.

IN MEMORIAM

While the study was in progress, Mr. Robert L. Smith, one of the instructors, died of cancer after a short illness. During the time Bob was engaged in the project, he gained the respect and admiration of his fellow workers and students. Bob was a very energetic and conscientious teacher. He had a sound and comprehensive understanding of today's traffic problem. One of Bob's outstanding qualities was his belief that driver education was important to the student, and his teaching championed this belief.

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CHAPTER I

INTRODUCTION

Background

During the past three decades this nation has witnessed a mammoth increase in the comprehensiveness and complexity of its transportation network. The jet aircraft of today makes any place in the United States accessible within a matter of hours. The motor vehicle, also, has played a most important part in the development of this nation into a mobile society. An ever-increasing network of streets, highways, and expressways is making every part of this country accessible to the motoring public. Today there are 3,704,914 miles of streets and highways in the United States.[1] There has also been a companion growth in the number of motor vehicles and licensed drivers. There are 103,000,000 licensed drivers operating 79,700,000 motor vehicles.[2] In the State of Washington 1,852,000 motor vehicles are operated by 1,705,000 licensed drivers on 72,424 miles of highways.[3]

The increasing dependence of American society upon this convenient form of mobility, however, has been accompanied by the increasingly complex and severe problem of accidents. Traffic accidents basically involve an interrelationship between the road, the motor vehicle, and the operator, plus additional factors such as other highway users. It appears logical, therefore, that prevention efforts should deal with each of these three components.

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[1] U. S. Department of Transportation, Highway Statistics 1967 (Washington: U. S. Government Printing Office), p. 167.

[2] National Safety Council, Accident Facts (1968 Edition; Chicago: National Safety Council), p. 40.

[3] U. S. Department of Transportation, *op. cit.*, cover, pp. 43, 167.

Implementation of engineering improvements in construction and design of trafficways and motor vehicles may result in fewer accidents as well as reduced severity of injury to occupants of vehicles in case an accident occurs. Without due attention to the human factor, however, substantial gains in traffic accident prevention appear to be improbable. The greatest potential may lie in the area of improved driver behavior. When the total driver population exhibits desirable operational performance, backed by in-depth knowledge and understanding of the complex traffic environment, a possible ultimate may be reached in safe and efficient use of motor vehicle transportation.

Many traffic safety authorities feel that education has a positive effect on driver and pedestrian behavior. The school should provide meaningful and relevant learning experiences in traffic safety education for all its students. Moreover, these experiences should be provided at all grade levels beginning with pedestrian performance in the primary grades and culminating in a high school driver and traffic safety education course consisting of both classroom and laboratory instruction, taught by competent, qualified and certified instructors.

William Haddon, Jr., Director, National Highway Safety Bureau, has said:

> I think it is the unique opportunity, responsibility, and privilege of the nation's driver education programs, and of all the dedicated people who carry them out, to have a greater influence than has any other single group related to highway safety.

> . . . .
>
> Perhaps what I really mean is that there are actually two goals for driver education. First, the program should provide basic instruction in driving techniques, a knowledge of how to handle a car in special circumstances, environments, and emergencies, and a knowledge of local and state motor vehicle and traffic laws and ordinances.
>
> Second, and just as important, we should be turning out a far more knowledgeable breed of citizen who will know enough about highway safety to demand and support higher and higher standards all along the line, in relation to each of the three phases [pre-crash, crash, and post-crash] of this continuing and tragic national problem.[4]

While driver and traffic safety education had its start during the 1930's, quantitative and qualitative expansion was slow during the early years. For example, during the 1941-42 school year only 7,500 students received a course in driver and traffic safety education in the United States.[5] In the State of Washington, at that time, it is estimated that not more than a half dozen public high schools offered such courses. As late as 1962, approximately 3,000 students were enrolled in an approved course in driver and traffic safety education in the secondary schools of Washington. An additional 1,000 students were enrolled in substandard programs.[6]

After World War II, increased use of automobiles indicated a growing need for more and better driver education. Efforts by national and state support organizations, traffic officials, school administrators, lay leaders, and legislators combined to intensify the attention to the serious public problem of accident prevention and the development of better traffic citizens. These coordinated efforts resulted in a most comprehensive growth. By the 1966-67 school year, 74 per cent of the nation's public high schools were providing courses with an enrollment figure which represent 56 per cent of beginning drivers in the United States.[7]

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[4] William Haddon, Jr., "Haddon on Highway Safety," Analogy (Northbrook, Illinois: Allstate Insurance Company, Winter, 1968) p. 6.

[5] Earl Allgaier, "Results of the Driver Education Program - 1936-65" (No. 3616; Washington: American Automobile Association, October, 1965).

[6] Results of survey in the fall of 1962 conducted by the Supervisor of Driver and Safety Education Programs, Office of the Superintendent of Public Instruction, State of Washington.

Since 1962, growth of driver and traffic safety education in the State of Washington has been greatly accelerated. During 1966-67, enrollment in approved school courses exceeded 30,000 of a potential of about 55,100 who reached the minimum legal driving age during that year.[8]

The enrollment trend is now rising sharply as a result of existing special financial support legislation and recognition of course values. In the State of Washington, such impetus was provided by the 1967 Legislature. RCW 46.20.100, Chapter 167, Laws of 1967, State of Washington, requires all students under the age of eighteen years to successfully complete an approved course in driver education as a prerequisite to licensing. Nationwide, the Highway Safety Act of 1966 (P. L. 89-564) is effecting a similar positive influence on program expansion and improvement. In order for a state to be eligible for federal funding under this Act, it must have a comprehensive highway safety program approved by the Secretary of Transportation. Such approval may not be legally granted unless the state's comprehensive program includes continuing, improved, and/or expanded driver education administered by appropriate school officials for all school-age youth. Since states without approved highway safety programs are subject to loss of funds made available through the Act, and in addition, are subject to a 10 per cent reduction in federal subsidy for highway construction, new attention is being focused on the need for more and better driver education in the secondary schools.

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[7] Insurance Institute for Highway Safety, 20th Annual Driver Education Achievement Program, 1966-67 School Year (Washington: Insurance Institute for Highway Safety), pp. 21-23.

[8] *Ibid.*

Meanwhile driver and traffic safety education, as indeed all disciplines taught in schools at one time or another, has been subjected to criticism. Even though critical of this subject field, Moynihan states:

> Now, at the hopeful beginnings of a new era, it becomes necessary to give a new cast to driver education. Although there is no conclusive proof as to the comparative effectiveness of various driver education techniques or, for that matter, the whole of present driver education practice, there is even less proof of the efficacy and value of any alternatives to present practices for communicating to the young person the rudiments of how to handle a car in modern traffic, and the associated social responsibilities. But operational driver education programs must continue. The problem is no different in principle than that for education in general. We have to continue with present systems even while recognized needed improvements are being studied. One would hardly advocate a moratorium on all schooling while looking for proof of better methods.[9]

The Office of the Washington State Superintendent of Public Instruction, desiring to provide for the best possible program of instruction, and recognizing both the criticism and its responsibility under new legislation to find effective and efficient means for program expansion and improvement, proposed a research investigation designed to evaluate the relative effectiveness of selected laboratory and classroom programs in driver and traffic safety education. The 1967 Legislature appropriated $151,000 for its conduct, described in the ensuing pages.

---

[9] Daniel P. Moynihan (Chairman), A Report of the Secretary's Advisory Committee on Traffic Safety (Washington: Department of Health, Education and Welfare, February 29, 1968), pp. 118-119.

Statement of the Problem

The purposes of this investigation are as follows:

1. To compare the relative effectiveness of four selected driver and traffic safety education laboratory programs (one-third of the students in each laboratory program receive one of the three classroom programs described on page 67):
    a. Standard Program (Groups IV-VI) - each student receives classroom instruction, plus six hours on-street driving instruction and twelve hours in-car observation.
    b. Simulator Program (Groups VII-IX) - each student receives classroom instruction, plus twelve hours simulator instruction, three hours on-street driving instruction, and six hours in-car observation.
    c. Range Program (Groups X-XII) - each student receives classroom instruction, plus six hours off-street multiple car driving range instruction (eight lessons), three hours on-street driving instruction, and six hours in-car observation.
    d. Four-Phase Program (Groups I-III) - each student receives classroom instruction, plus eight hours simulator instruction,

six hours off-street multiple car driving range instruction (eight lessons), two hours on-street driving instruction, and four hours in-car observation.

2. To compare the relative effectiveness of three selected driver and traffic safety education classroom programs:
    a. Thirty hours classroom instruction
    b. Thirty hours classroom instruction plus fifteen hours drivocator instruction
    c. Forty-five hours classroom instruction.
3. To determine whether the relative effectiveness of the laboratory and classroom programs indicates differences between female and male students.

Criterion Measures

The following criterion measures, described in detail in Chapter III, were used:

1. Pre-Test for Driving Knowledge
2. Post-Test for Driving Knowledge
3. Post-Test for Driving Performance - Total
4. Post-Test for Driving Performance - Part I
5. Post-Test for Driving Performance - Part II
6. Post-Test for Traffic Analysis

Hypotheses

1. There should be no significant differences among the mean scores attained on each of the criterion measures by students randomly assigned to one of four types of laboratory programs - standard, simulator, range, and four-phase.

   H_0: $\overline{X}_1 = \overline{X}_2 = \overline{X}_3 = \overline{X}_4$.

   H_1: A significant difference should exist among the mean scores attained on each of the criterion measures by students assigned to the laboratory programs.

2. There should be no significant differences among the mean scores attained on each of the criterion measures by students randomly assigned to one of three types of classroom programs - thirty hours classroom instruction, thirty hours classroom instruction plus fifteen hours drivocator instruction, and forty-five hours classroom instruction.

   H_0: $\overline{X}_1 = \overline{X}_2 = \overline{X}_3$.

   H_1: A significant difference should exist among the mean scores attained on each of the criterion measures by students assigned to the classroom programs.

3. There should be no significant differences between mean scores attained on each of the criterion measures by female and male students.

   H_0: $\overline{X}_1 = \overline{X}_2$.

   H_1: A significant difference should exist between the mean scores attained on each of the criterion measures by female and male students.

4. There should be no significant differences among the four laboratory programs in the number of students rejected on the McGlade Road Test.

   H_0: $\overline{X}_1 = \overline{X}_2 = \overline{X}_3 = \overline{X}_4$.

   H_1: A significant difference should exist among the four laboratory programs in the number of students rejected on the McGlade Road Test.

5. There should be no significant differences among the three classroom programs in the number of students rejected on the McGlade Road Test.

   H_0: $\overline{X}_1 = \overline{X}_2 = \overline{X}_3$.

   H_1: A significant difference should exist among the three classroom programs in the number of students rejected on the McGlade Road Test.

6. There should be no significant differences between female and male students in the number of students rejected on the McGlade Road Test.

   H_0: $\overline{X}_1 = \overline{X}_2$.

   H_1: A significant difference should exist between female and male students rejected on the McGlade Road Test.

7. There should be no significant differences among the four laboratory programs in the proportion of students who pass and fail the McGlade Road Test.

   H_0: $\overline{X}_1 = \overline{X}_2 = \overline{X}_3 = \overline{X}_4$.

   H_1: A significant difference should exist among the four laboratory programs in the proportion of students who pass and fail the McGlade Road Test.

8. There should be no significant differences among the three classroom programs in the proportion of students who pass and fail the McGlade Road Test.

   H_0: $\overline{X}_1 = \overline{X}_2 = \overline{X}_3$.

   H_1: A significant difference should exist among the three classroom programs in the proportion of students who pass and fail the McGlade Road Test.

9. There should be no significant differences between female and male students in the proportion of students who pass and fail the McGlade Road Test.

   H_0: $\overline{X}_1 = \overline{X}_2$.

   H_1: A significant difference should exist between female and male students in the proportion of students who pass and fail the McGlade Road Test.

10. There should be no significant gain in mean scores from pre-test to post-test for driving knowledge within any of the three classroom programs, four laboratory programs, female students, or male students.

    H_0: $\overline{X}_1 = \overline{X}_2$.

    H_1: $\overline{X}_1 < \overline{X}_2$.

To provide additional information regarding the interrelationships among the criterion variables, product-moment correlations were computed. Significances of intercorrelations were tested against the following projected null hypothesis.

11. There should be no significant linear correlations between scores on the six criterion measures.

For the purpose of this study, statistical significance equal to or less than the .05 level is accepted as sufficient evidence for the rejection of the null hypotheses.

Definitions

Approved School Course - a course in driver and traffic safety education approved by the Washington State Office of the Superintendent of Public Instruction, consisting of a minimum of thirty clock hours of classroom instruction, an equivalent of six hours of behind-the-wheel instruction and twelve hours of observation time.[10]

Auto Trainer - a type of driving simulator consisting of a driver's compartment with regular controls, a continuous canvas belt (mounted in front of the compartment) which moves in response to the accelerator and brake, and a miniature car which can be steered over a roadway painted on the belt.[11]

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[10] Office of the Superintendent of Public Instruction, 1964 Driver Education Guide (Olympia, Washington: Office of the Superintendent of Public Instruction, 1965), p. 15.

Certified Instructor - a driver and traffic safety education instructor certified by the state educational certification agency as having satisfied the minimum requirements for certification in driver and traffic safety education.

Classroom Instruction - instruction given groups of students covering the subject content in the areas of traffic citizenship, laws and regulations, characteristics of drivers, role of government, automobile use, and traffic problems. (Each student involved in this investigation was assigned randomly to one of the three classroom programs: (1) thirty hours classroom instruction, (2) thirty hours classroom instruction plus fifteen hours drivocator instruction, and (3) forty-five hours classroom instruction.)

Driving Procedures - a set of procedures or instructions relating to the methods to be followed in the performance of a particular skill or driving action (see Appendix A).

Driver and Traffic Safety Education - selected formal learning experiences consisting of classroom and laboratory instruction, designed to help students become good traffic citizens and use motor vehicles safely and efficiently.

Drivocator - a completely automated multi-media teaching device that utilizes motion picture, filmstrip, magnetic tape, individual student responder, and a portable master console control unit. Student responses are recorded on the master control unit which gives the instructor an immediate indication of student comprehension, both as individuals and as a group, of the content presented and the questions asked (see Appendix B for drivocator lesson titles).

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[11] James H. Fox, Driver Education and Driving Simulators (Washington: National Education Association, National Commission on Safety Education, 1960), p. 51.

Dual Control Car - a practice-driving automobile equipped with an automatic transmission, a safety belt for each occupant, and an extra brake pedal for use by the teacher during an emergency situation.

Examiner - the instructors and/or driver examining supervisors of the Washington Department of Motor Vehicles involved in administering the McGlade Road Test.

Fail - those students either rejected for reasons indicated in the ensuing definition of that term or registering deductions of fifty-five points or more on the McGlade Road Test.

In-Car Observation - the learning experiences a student receives (as a passenger) in a dual-control car exclusive of actual driving (behind the wheel).

Instructional Treatment Group - a prescribed combination of different types and amounts of classroom and laboratory learning experiences.

Knowledge Test - a test for determining the driving knowledge acquired by each student during the course.

Laboratory Instruction - an extension of classroom instruction which provides students with teacher-supervised traffic experiences under real and/or simulated conditions.[12]

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[12] Thomas A. Seals, "An Evaluation of Selected Driver and Traffic Safety Education Courses" (unpublished doctoral dissertation, Florida State University, August, 1966), p. 13.

McGlade Road Test - a road post-test to determine the performance level of each student in operating a motor vehicle under traffic conditions.

Off-Street Multiple Car Driving Range - a hard-surfaced area on which eight to twelve student-operated, practice-driving vehicles are used simultaneously to provide a portion of laboratory instruction under the direct supervision of a teacher. The area provides environmental conditions designed for development of fundamental driving skills; road surfaces wide enough for two-way and multiple-lane traffic; intersections, curves, lane markings and signs; expressway entrance and exit, hills, and parking. Each car utilized on this facility is equipped additionally with an FM radio as a means of communication between the teacher and the student operators.

On-Street Driving Instruction - selected student learning experiences while actually operating a dual-control car on public streets and highways under the direction of a qualified and certified teacher of driver and traffic safety education seated to the right of the student driver. (To satisfy the objectives of this report, each student also received two hours of in-car observation for each hour of on-street driving instruction.)

Pass - those students completing the McGlade Road Test with maximum deductions of fifty-four points.

Perception - that facet of the driving task which involves the decision making abilities of the driver and is based on discriminating or interpretating the visual stimuli that are received on a continuous basis while operating a motor vehicle; the identification of incoming stimuli, especially those related to the driving task; and the organization of the incoming stimuli for identification responses or patterns of behavior.[13]

Project - this is construed to reflect the sum total of investigative activities from September, 1967, through June, 1968.

Qualified Instructor - an instructor in this study who was certified (as defined) to teach driver and traffic safety education in the State of Washington and who was involved in the pre-study in-service education program as described in Chapter III.

Reject - those students whose Road Test was terminated because they were involved in an accident, committed a dangerous action, committed a clear violation of any traffic law, exhibited a lack of cooperation, or refused to perform as instructed by the examiner.[14]

Simulation - a teaching method employing both films and electro-mechanical devices, designed to represent the driver's compartment of the automobile for student development of proper judgment and behavior responses as well as manipulative skills.[15]

Study - that portion of the project from January, 1968, through June, 1968.

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[13] James E. Aaron and Marland K. Strasser, Driver and Traffic Safety Education - Content, Methods and Organization (New York: The Macmillan Company, 1966), pp. 74-75.

[14] Francis S. McGlade, A New Road Test for Use in Driver Licensing, Education and Employment (New York: New York University, Center for Safety Education, 1961), p. 22.

[15] Fourth National Conference on Driver Education, Policies and Practices for Driver and Traffic Safety Education (Washington: National Education Association, National Commission on Safety Education, 1964), p. viii.

Teaching Points - a predetermined group of instructions, i.e., items of emphasis, utilized by each instructor to supplement the driving procedures.

"You Are the Jury" Traffic Analysis Test - a post-test administered each student to ascertain his ability to analyze a traffic accident, identify the causes of the accident, and suggest how the accident could have been prevented.

Delimitations

This investigation is limited to an examination of driving knowledge, ability to analyze a traffic accident in determining how the accident could have been prevented, and driving performance possessed by student groups which have completed one of four types of high school driver and traffic safety education laboratory programs, and one of three types of classroom programs.

It is further limited to include only those sophomore students at Renton High School, Renton, Washington.

It does not attempt to measure behavioral aspects of drivers, nor is any attempt made to predict the driving habits or behavior of a person.

Neither is any attempt made to prove that any one of the instructional conditions treated in this investigation comprises an ideal program in driver and traffic safety education.

This project is further limited by the amount of time available.

Basic Assumptions

1. The McGlade Road Test[16] is accepted as a valid and reliable instrument for determining the level of driving performance by student groups.
2. The Knowledge Test developed by Brody[17] is accepted as a valid and reliable instrument for measuring driving knowledge possessed by students.
3. The "You Are the Jury" Traffic Analysis Test[18] is accepted as a valid and reliable instrument for measuring a student's ability to analyze a traffic accident, to identify the cause of the accident, and to determine how the accident could have been prevented.
4. The procedural training provided for testing personnel[19] is assumed sufficient for administration of knowledge, traffic analysis, and driving performance tests.
5. Standardization of instruction is assumed as having been attained through development of driving procedures and teaching points, the preplanning of all classroom and laboratory lessons and their correlation to each other; the conduct of an intensive in-service education program; weekly meetings of the total staff, and periodic meetings of teachers concerned with a specific phase of instruction.

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[16] McGlade, loc. cit. (see Appendix C).

[17] National Test in Driver Education (Special Form: New York: New York University, Center for Safety Education, 1967) (see Appendix C).

[18] "You Are the Jury" Traffic Analysis Test, developed as a part of this investigation (see Appendix C).

[19] As described in Chapter III, pp. 57-58.

6. Group scores attained on the driving knowledge, road performance, and traffic analysis tests are assumed to constitute an acceptable qualitative measure of instruction.
7. The random assignment technique employed is accepted as assuring that the comparison groups achieved balance with respect to factors which might have affected the results.

Significance

Field experience in many states indicates that the employment of innovative techniques of instruction in driver and traffic safety education constitutes a valuable contribution to such education for young drivers. A deterrent to progress in many states is the reluctance of administrators and teachers to accept the results achieved in simulation, range, and four-phase programs as comparable to the results of the standard or traditional driver education program. However, there has also been insufficient research to clearly indicate which type of driver and traffic safety education program is superior. Since this investigation concerns not only the relative effectiveness of selected laboratory and classroom programs, but also the differential effect that these programs may have on female and male students, the outcomes may have a significant influence on the future structure of driver and traffic safety education courses in Washington and elsewhere.

Tasks (Sub-Problems)

The following tasks are identified as sub-problems and serve as an outline for the description of procedures in Chapter III of this report:

1. Selecting a school large enough in student population to provide a statistically sound study sample.
2. Providing a staff of instructors with the necessary competencies to provide equivalent and quality instruction in the different instructional treatment groups.
3. Developing standardized procedures and lesson content for student instruction.
4. Providing the necessary facilities and equipment to conduct the study.
5. Creating an experimental design to compare the relative effectiveness of four selected laboratory programs and three selected classroom programs, and to determine the significance of the sex factor.
6. Assigning students randomly to each of the different instructional treatment groups.
7. Assigning instructors to the different phases of instruction.
8. Selecting and/or developing valid and reliable measurement instruments and standardizing procedures for administering the tests.
9. Collecting and applying statistical treatment of the data.

CHAPTER II

REVIEW OF LITERATURE

This investigation, the Washington Driver and Traffic Safety Education Study, was concerned with the analysis and evaluation of school programs of both classroom and laboratory instruction in driver and traffic safety education. Another component aspect comprised the difference in achievement between female and male students assigned to selected laboratory and classroom programs. A review of existing literature reveals that very little investigation has been performed in either the classroom phase of instruction or the comparative achievement of female and male students in driver and traffic safety education programs. There have been several which have evaluated the relative effectiveness of different combinations of laboratory programs. This chapter presents the data available and the parts of these investigations which are pertinent to this study.

Although inadequate at the present time, the need for development of more effective techniques of instruction has been voiced. The Wisconsin Department of Public Instruction conducted a three-day workshop on the classroom curriculum in June, 1967. Its concern was expressed in the following excerpt from the outline/schedule distributed to the sixteen participants prior to the workshop.

> The classroom instruction is the key to success in a driver education program, regardless of the laboratory methods employed. It is this phase of the total instructional program that determines the foundation for which all other phases must depend. Because of this, and the fact that too little investigation into this area has been attempted in the recent past, it is imperative that the classroom curriculum be evaluated.

> The objectives, content, methods, and presentation technique must be scrutinized to see what changes (modifications) in philosophy regarding these areas should be undertaken. A well-balanced program (within the time allowed) of classroom instruction to meet the needs of today's students will be the primary purpose of this workshop study. Today's students - tomorrow's drivers - demand an up-to-date classroom instructional program utilizing recent advances in this curriculum.[1]

A number of states have developed driver education guides which have included sections on classroom instruction. In referring to such instruction, one of these, the Florida Driver Education Guide, states:

> In the classroom phase learning experiences emphasize personal and social problems related to the safe and efficient movement of traffic. One major aim is to emphasize the desirable role of the pedestrian and driver in traffic, and another is to develop the knowledge and attitudes needed for safe use of traffic facilities.[2]

The Washington Driver Education Guide has expressed a similar view:

> Classroom instruction is designed to give the student a preliminary and theoretical knowledge of all the problems and skills a driver must have while he is undergoing actual behind-the-wheel training outside of class.
>
> The complete program of classroom instruction should include the following six units:
>
> The Traffic Problem
> The Driver
> The Automobile
> Laws and Regulations
> Driving Skills
> The Pedestrian and Other Highway Users[3]

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[1] Wisconsin Department of Public Instruction, Wisconsin Classroom Curriculum Instructional Driver Education Workshop Proceedings, June 15-17, 1967 (Madison: Wisconsin Department of Public Instruction), p. 40.

[2] Florida Department of Education, A Guide, Driver Education in Florida Secondary Schools (Bulletin No. 6; Tallahassee: State Department of Education, 1963), p. 26.

[3] Office of State Superintendent of Public Instruction, 1964 Driver Education Guide (Olympia: Office of State Superintendent of Public Instruction, 1965), pp. 26-33.

The Fourth National Conference on Driver Education recommended that a complete program of classroom and laboratory instruction include:

TRAFFIC CITIZENSHIP: responsibility to other drivers and highway users . . . community, family, self, etc. . . . attitudes of safe living . . . courtesy and manners . . . support of public officials . . . traffic control devices

LAWS AND REGULATIONS AND THEIR ENFORCEMENT BY COURTS: uniform traffic laws and ordinances, state motor vehicle laws, Uniform Vehicle Code and Model Traffic Ordinance . . . official safety agencies

CHARACTERISTICS OF DRIVERS: mental, emotional, physical, and physiological

SOCIETY AND DRIVING: effects of alcohol and drugs . . . psychology and driving . . . our culture and driving

DRIVING SKILLS: basic habits and maneuvers . . . driving in the city, on the highway, on expressways . . . hazardous conditions and meeting emergencies . . . efficient driving

DEVELOPMENT OF JUDGMENTS: vision and perception . . . knowledge and analysis of traffic situations . . . making decisions . . . reaction time . . . physical laws that affect drivers and pedestrians

THE MOTOR VEHICLE: history and development . . . economics of vehicle ownership . . . trip planning . . . mechanics of the vehicle . . . safety devices . . . vocational driving

TRAFFIC ACCIDENTS: causes . . . human and economic loss . . . what to do in case of an accident . . . built-in response systems for meeting the unexpected

ENGINEERING: automotive . . . highway . . . traffic.[4]

Research on the relative effectiveness of different programs in driver and traffic safety education for female and male students is also limited. However, a survey of nearly two hundred driver education instructors conducted by the Aetna Drivotrainer staff, ". . . revealed that most instructors polled believe that boys learn to drive more quickly than girls. When it comes to courtesy, however, they felt that the girls leave the boys behind."[5]

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[4] Fourth National Conference on Driver Education, Policies and Practices for Driver and Traffic Safety Education (Washington: National Education Association, National Commission on Safety Education, 1964), pp. 4-5.

Project TALENT provided additional information on this subject although it was not directly related to driver and traffic safety education. It was reported that:

> . . . Boys seemed to acquire significantly more information than girls in many areas, including mathematics, physical science, aeronautics and space, electricity and electronics, mechanics, and sports; they also had significantly larger score gains than girls on several aptitude tests, including Creativity, Mechanical Reasoning, Visualization in Three Dimensions, and Abstract Reasoning.[6]

Crancer, Washington State Department of Motor Vehicles, conducted a study which analyzed the accident and violation rates for four different types of driver training programs. His investigation revealed a wide range in the number of accidents and violations from 1961 to 1967 in the State of Washington between females and males, with the females having the lesser number of accidents and violations per one hundred drivers.[7]

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[5] "Teachers Surveyed on Drivotrainer System," Drivotrainer Digest, Vol. VI, No. 1 (May, 1963), p. 12.

[6] "Cognitive Growth During High School," A National Longitudinal Study of American Youth - Project TALENT, Bulletin No. 6 (April, 1967), p. 1.

[7] Alfred Crancer, An Evaluation of Driver Training Based on Accident and Violation Rates (Report 004; Olympia, Washington: State Department of Motor Vehicles, May, 1967), pp. 4-9.

Loft conducted a study which considered the effects of a driver education course in driving knowledge and attitudes of high school seniors. Students were given the General Test on Traffic and Driving Knowledge and the Siebrecht Attitude Scale.

The investigation revealed the following findings that were pertinent to this study:

1. Girls and boys who had driver education scored higher on the knowledge test and attitude scale.
2. A combination of girls who had received and who had not received a course in driver education scored higher on the knowledge test than the boys combined.
3. Driver education girls received higher scores at the .05 level of confidence on the knowledge test than non-driver education girls, non-driver education boys, and the driver education boys.[8]

Two of the conclusions which were drawn as a result of the study were:

> . . . .
>
> 6. Driver education courses should consist of specific learning experiences for boys so that attitudes and adequate knowledge will be a realistic outcome of such a course.
>
> . . . .
>
> 8. Students in driver education should be required to take a screening test at the beginning of the course as a means of determining their needs.[9]

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[8] Bernard I. Loft, "The Effects of Driver Education on Driver Knowledge and Attitudes in Selected Public Secondary Schools," Traffic Safety Research Review (June, 1960), pp. 13-14.

[9] *Ibid.*, p. 15.

One of the recommendations which resulted from the investigation was that "a study be made to determine if driver education courses should have any different content and/or methodology for girls and/or boys."[10]

In the article, "The Challenge from Within," Boyer comments on meeting the needs of students:

> . . . The emphasis is too often on subject matter to be learned, not on the needs of the learner. This can be shown by the use of available textbooks. No authors have ever considered their work to be the last word, but a lot of instructors never deviate from the printed text. Each student is given the same information regardless of his ability, background or need. In other disciplines, those same students are provided with opportunities to interpret and relate to their needs.[11]

Toms, Director of the Washington State Department of Motor Vehicles, voiced certain observations concerning classroom instruction at the 1967 Illinois Annual State Conference for Driver and Traffic Safety Education:

I. The classroom teacher should utilize more of the following approaches:

  A. Non-directive teaching.

  B. Individual problem approach.

  C. We as teachers subject our youth to too much of our morals, likes and dislikes in trying to teach them.

  D. We must be able to communicate with youth in order to teach them and to change or influence their behavior.

  E. How do we assess risks?

    1. It is impossible to teach every specific risk or accident situation.

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[10] Ibid.

[11] Richard G. Boyer, "The Challenge from Within," CALDEA Calendar, Vol. XV, No. 1 (October, 1967), p. 7.

II. We must change our approach in teaching driver education and take a closer look at the content we are teaching.

   A. We must consider such newer approaches as:

      1. Programmed instruction.

      2. Team teaching.[12]

The traditional classroom presentation in driver and traffic safety education has been the lecture-textbook approach. Some imaginative and energetic instructors have incorporated films, filmstrips, slides, transparencies and overlays, 8mm films, team teaching, small group discussions, and other teaching techniques into their presentation.

A comparatively recent innovation in driver and traffic safety education is the use of multi-media in classroom instruction. An example of such is the EDEX Learning System, more commonly known as the Aetna Drivocator System, which has received favorable support from many instructors who have used it. Class interest and student participation in many instances has increased.

In the article, "Multimedia - A New Classroom Concept," Cook proposes the following advantages of the Drivocator:

> The film series is designed to take beginning students through driver education's most essential learning phase. Each lesson is complete in itself, since the Drivocator units are designed to correlate readily with textbook materials and thus provide the teacher as much flexibility in his course content as he may desire.
>
> . . . .

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[12] Segments of a summary of an address given by Douglas Toms at the 1967 Illinois Annual State Conference for Driver and Traffic Safety Education.

> Early reports reaching us indicate that the Drivocator system lends desirable elements of both flexibility and uniformity to classroom driver education. Surprisingly, for all its technical capability, the system actually demands more of the teacher - principally because it draws greater response from the student.[13]

However, no research concerning the Drivocator's effectiveness as part of the high school driver and traffic safety education curriculum has been reported. Some, though, which contain implications for driver and traffic safety education has been reported on its use in other areas.

In an article, "A Special Report on Technology for Education," Herbert discusses the development of teaching machines, programmed learning, and other forms of innovation in educational technology. Among other observations, he states:

> The greatest involvement of a student in the teaching process and perhaps the method by which he learns most is by interaction with a data source - extracting information, testing hypotheses, making right or wrong decisions and learning by immediate detection and correction of his errors. . . .
>
> . . . .
>
> . . . The criterion for progress is not how much material is covered, but how well it is learned. Such programmed material changes the teacher's role in a special way. . . .[14]

Where feedback to the student and teacher is utilized, as in the Drivocator, it is helpful to the instructor in revising and improving the program presentation.[15]

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[13] Dean R. Cook, "Multimedia - A New Classroom Concept," CALDEA Calendar, Vol. XV, No. 1 (October, 1967), p. 24.

[14] Evan Herbert (Associate ed.), "A Special Report on Technology For Education," International Science and Technology (August, 1967), p. 31.

[15] Ibid., p. 32.

The Western Greyhound Corporation examined the driving records of 1,500 of their drivers who participated in the Drivocator program, and 1,500 of their drivers who did not participate in the program. The results showed a significantly measurable reduction in the number of accident-producing incidents for the group of drivers who participated in the program.[16]

During 1966 and 1967, the New Jersey Police Training Commission evaluated different types of teaching environments and materials which affect the learning impact on their personnel. Among other things, they found a more favorable attitude rating among those who had received multi-media instruction instead of the lecture-discussion method of teaching. The study also revealed that class environment is of the utmost importance if police training programs are to be effective when measured in terms of learning and student satisfaction.[17]

Studies involving Internal Revenue personnel indicate that EDEX training has contributed to improved performance effectiveness.[18] Instructors were also able to identify quickly high and low scores in the program, thus enabling the instructor to give closer observation and assistance to low scoring students.[19]

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[16] "Something New in Safety," EDEX Teaching Systems (Mountain View, California: EDEX Corporation), p. 2.

[17] Charles C. Drawbaugh, "Evaluating the Concept of Mobile Police Training," The Police Chief (August, 1968), p. 60.

[18] "Report on EDEX-ADP Training" - for the Internal Revenue Service, p. 13.

[19] *Ibid.*, p. 20.

A news release from the Air Defense Command, United States Air Force, concerning the implementation of a driver training program, announced:

> All personnel in Air Defense Command under 26-years of age will be required to take a mandatory 18-hour drivers training course when the Air Force implements a new Multi Media Traffic Safety Teaching System, Ground Safety officials announced here today.[20]

Barcus, Hayman, and Johnson conducted a study which compared programmed texts, teaching machines, and conventional classroom instruction using teachers with varying amounts of training and experience. They found:

> . . . with proper conditions and at least with the rather mechanical, non-creative type learning involved in this study, automated instruction can be as effective as the more traditional teacher-directed method. In fact, the teaching machine results suggest that automated instruction can be superior, though conditions for this superiority are uncertain.[21]

Bridgeman conducted a study utilizing an individual student response system and counter which was placed in view of the instructor but not the students. The students would respond to a battery of multiple choice questions built around major concepts covered in lectures and laboratory periods.[22] He concluded:

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[20] "Driver Training To Be Implemented," United States Air Force New Release (Colorado Springs, Colorado: Air Defense Command, USAF, May 26), p. 1.

[21] An Abstract of Pertinent Research Related to EDEX Educational Systems (Mountain View, California: EDEX Corporation), pp. 5-6, citing Delbert Barcus, John L. Hayman, and James T. Johnson, Jr., "Programmed Instruction in Elementary Spanish," Phi Delta Kappan, March, 1963.

[22] Ibid., p. 8, citing Charles Bridgeman, "A Lecture Response Device: A Preliminary Report on a Key Aspect of a Co-ordinated Teaching Program in Anatomy," Journal of Medical Education, February, 1964.

> In general, the student profits by the improved structuring of the information he receives. The instructor retains control of the flow of information, exercises his prerogatives as a personality, and invokes his own style of lecturing. But by using this electronic response device as a learning tool he can accurately sense the needs of a large group of students and freely adjust his presentation in the tutorial manner.[23]

Lancaster, at the Pennsylvania State University, conducted a study utilizing immediate reinforcement to students.

> The theory of learning indicates that students would learn more efficiently if they were reinforced as soon as they made the correct response to a new concept. A simple device (MARI) for giving students immediate reinforcement within a class period was designed, built, and tested in actual classrooms. Not only would MARI reinforce the student when he made the correct answer but it would also indicate to the instructor the percentage of the class responding correctly. The merit of this teaching aid was evaluated in terms of the usual hour tests, by comparing the achievement of students in classes using MARI with control groups not using MARI. The first year the results were statistically highly significant in favor of using it. Later results were not. Yet it is strongly believed that some such device could be designed which would enhance classroom learning and that other experiments should be conducted.[24]

The School of Dentistry at Loma Linda University used the EDEX Automatic Teaching System to evaluate the instructional efficiency of a programmed-group instructional approach to teaching in dentistry. The non-EDEX group did not receive the traditional instructional program, but highly organized, programmed materials which would be presented in a similar manner to students using the EDEX System.[25]

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[23] Ibid., pp. 8-9.

[24] Ibid., p. 20, citing Otis E. Lancaster, "MARI: Motivator and Response Indicator," I.R.E. Transactions on Education, December, 1961.

[25] Edwin M. Collins, Earl C. Collard, and Deryck R. Kent, "Programmed-group Instruction in Dental Education," Journal of Dental Education, Vol. 31, No. 4, pp. 511-512.

> In general, results reveal a slight, often non-statistically significant difference between the Edex and non-Edex treatments in favor of Edex. The difference was so modest in the individual class sessions that significant differences were _not_ yielded in all but 1 of the 12 separate comparisons. . . .
>
> . . . there was no significant difference in the over-all quiz performance or midterm performance, although both results favor the Edex group. There was, however, a significant difference ($p < .01$) on the final examination performance favoring the Edex group.[26]

Much more attention has been given to the investigation of the laboratory phase of instruction in driver and traffic safety education. A large part of such research has dealt with some type of simulation. The first simulator program was conducted at Lane Technical High School in Chicago.

> . . . it is likely that these 'homemade' simulators were constructed and used, primarily, to give students practice in steering, shifting gears, and braking. . . .
>
> In 1953, the Aetna Life Affiliated Companies produced the Drivotrainer. . . . The first motion pictures were on black and white film, but color film was introduced during the early 1960's. . . .
>
> The Auto Trainer of the American Automobile Association consisted of the usual automobile controls which determined the speed and direction of a miniature car operating on a moving roadway painted on an endless canvas belt. . . .
>
> The Allstate Insurance Company, in 1962, introduced the Allstate Good Driver Trainer which operated in a manner similar to the Drivotrainer. It featured use of wide-screen film and a system for immediate feedback of student errors.[27]

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[26] _Ibid._, p. 514.

[27] Herbert J. Stack, _History of Driver Education in the United States_ (Washington: National Education Association, National Commission on Safety Education, 1966), pp. 36-37.

The growth of simulation investigation has been considerable. The Insurance Institute for Highway Safety reported that more than 1,000 schools taught 334,000 students in simulators during the 1967-68 school year.[28]

Two policy statements in 1958 greatly influenced the growth of simulator instruction during the last decade. The first of these was a result of the Third National Conference on Driver Education held at Purdue University:

> In recognition of simulators, the value of which has been established by research, simulated driving experience can be used in lieu of half of the recommended ratio of four to one. Decision for approval of any simulator should be the responsibility of the individual State Department of Education.[29]

A second is from the Driver Education Section of the National Safety Council:

> The National Safety Council supports and encourages the use of laboratory equipment to simulate behind-the-wheel driver experience in high school driver education courses. Also, the Council encourages continued research as to the manner in which such devices can be most effectively used in the teaching of driver education.[30]

These policy statements were based on the outcomes of previous research studies in the area of simulation.

In 1953, LeVan conducted a study, as a part of a Master's Thesis at Temple University, which examined the use of the Auto Trainer as a possible way of reducing the amount of time spent in the on-street phase of instruction. "The study design called for two groups of students: one, the experimental group, received Auto Trainer experience; the other, the control group, received the regular instruction."[31] The author arrived at the following conclusions:

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[28] Insurance Institute for Highway Safety, 21st Annual Driver Education Achievement Program, 1967-68 School Year (Condensed Report; Washington: Insurance Institute for Highway Safety, 1968).

[29] Herbert J. Stack, "A Resume and Evaluation of Research on the Teaching Effectiveness of Simulated Driving Experiences and Conventional Driver Education Methods," Traffic Safety Research Review, Vol. 3, No. 4 (December, 1959), p. 12.

[30] *Ibid.*

> 1. Approximately 148 minutes of instruction on the Auto Trainer will save 47.5 minutes' instruction time in the car. The road test scores were approximately the same for the experimental and the control groups.
> 2. There were no statistically significant differences between the two groups in driving ability.
> 3. The basic skills required in the instruction task and the actual task seem to be similar, for the Auto Trainer scores of the experimental group, the control group, and the experienced group of drivers were not significantly different.
> 4. Driving ability as measured by the road test scores was not related to driving abiltiy as measured by the Auto Trainer scores. Three of the test items (errors, steering, and reaction time) showed a positive relationship, while the fourth (steering movement) showed no relationship. It is thus concluded that the steering movement scores lack reliability.
> 5. The students indicated a definite interest in the Auto Trainer for instructional purposes.[32]

A more recent study of the Auto Trainer's effectiveness was reported in 1959 by Allgaier and Yaksich. Two groups of students were used in the study. The control group received the traditional on-street program. The experimental group received Auto Trainer instruction as a substitute for part of behind-the-wheel instruction in a dual-control car. Two conclusions reported in the study were: (1) both groups did equally well on the final road test, and (2) Auto Trainer instruction made it possible to teach one-third more students per unit of instructional time.[33]

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[31] James H. Fox, Driver Education and Driving Simulators (Washington: National Education Association, National Commission on Safety Education, 1960), p. 52, citing Paul S. LeVan, "The Value of an Auto Training Device in the Teaching of Driver Training" (Master's Thesis, Temple University, 1953).

[32] *Ibid.*, p. 54.

The December, 1961, issue of Traffic Safety reported the results of a study by Heeter and Allgaier. In the study, forty-four students received eight hours instruction in the car and no practice on the Auto Trainer (Group D) while one hundred twelve students received the following amounts of practice on the Auto Trainer but less practice in a car:

Group A - Nine hours Auto Trainer, five hours car.
Group B - Four hours Auto Trainer, four hours car.
Group C - Four hours Auto Trainer, six hours car.

At the conclusion of instruction, all students were given a road test.

The following conclusions reached from this study and previous studies using the Auto Trainer seem justified:

1. Practice on a simulator can be substituted for a substantial amount of practice driving in a car, thus, reducing the cost per student trained.

2. Because of lack of precise measurements of performance, it is not possible to determine a precise substitution ratio that is the number of hours of practice on a simulator which are equivalent to an hour of practice in a car.

3. The law of diminishing returns apparently applies. After a certain number of hours of practice on the simulator, little is gained by additional practice.

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[33] Earl Allgaier and Sam Yaksich, Effectiveness of a Driving Simulator (Washington: American Automobile Association, Traffic Engineering and Safety Department, 1959), p. 4.

The results of the study also showed that scores made on the road test by males were slightly better than the scores by females but the difference was not statistically significant.[34]

In 1955, a study was conducted to determine if students trained in a program involving the Aetna Drivotrainer would have the same driving ability as those trained by the present methods of the Los Angeles City Schools. The students were divided into two groups. The control group received six class hours of behind-the-wheel training. The experimental group received three class hours of behind-the-wheel training, plus sixteen class hours in the simulator.[35] The staff made the following conclusions:

1. Results indicate that practically the same progress in driving skill and knowledge will be experienced by a student trained by either the experimental method using the Aetna Drivotrainer plus three hours of on-the-road training, or the California State prescribed course.

2. While increment in driver knowledge as measured by the final test for Sportsmanlike Driving and Man and the Motor Car texts was observed, there was no evidence that either the control or the experimental group established a statistically significant advantage.

. . . .

4. Both groups made significant improvement in driving ability as measured by the Aetna Road Test. The experimental group showed significantly greater improvement. Familiarity with the machine may have influenced the results in this instance.

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[34] Lewis M. Heeter and Earl Allgaier, "Can a Simulator Sub for a Car?" Traffic Safety (December, 1961), p. 21.

[35] An Evaluation of the Teaching Effectiveness of the Aetna Drivotrainer (a Condensed Report of the Los Angeles Study; Hartford, Connecticut: Aetna Casualty and Surety Division, 1955), p. 5.

5. There is a very slight indication of possible difference in driving ability, as measured by the Road Test, in favor of the control group. However, the level of significance for this difference was not great enough to warrant unqualified acceptance.[36]

In 1956, a study was undertaken at Iowa State Teachers College to assess the worth of the Aetna Drivotrainer as a replacement for part of the on-street instruction in a high school driver education program. The instruments used to evaluate the effectiveness of student performance were the Iowa Driver's License Examination Score Sheet and a Final Drivers Test. Three hours of dual-control car instruction plus fifteen class periods of Drivotrainer instruction (fifty minute periods) were found to produce results at least as good as those produced by six hours of dual-control-car instruction.[37]

In 1958, Bernoff completed a study designed to investigate specifically the following problems:

1. Do students trained with the Drivotrainer possess a driving attitude comparable to that of students trained in a minimum conventional course?
2. Do students trained with the Drivotrainer possess as much driving knowledge as students trained in a minimum conventional course?
3. Do students trained with the Drivotrainer possess as much skill in manipulating an automobile as students trained in a minimum conventional course?[38]

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[36] Ibid., p. 17.

[37] Gordon J. Rhum, Bertram L. Woodcock, and Tom A. Lamke, The Effectiveness of the Aetna Drivotrainer in Driver Education (Hartford, Connecticut: Aetna Casualty and Surety Company, July, 1956), pp. 3-20.

[38] Louis I. Bernoff, An Experimental Study of the Teaching Efficiency of the Aetna Drivotrainer System (Hartford, Connecticut: Aetna Life and Casulaty, June, 1958), p. 5.

His Drivotrainer course consisted of sixteen hours in the Drivotrainer, supplemented with three hours behind-the-wheel and six hours observation in a dual-control car. The conventional course consisted of six hours behind-the-wheel instruction and twelve hours of observation in a dual-control car.[39]

The following is a summary of the major findings of the Bernoff investigation which are pertinent to this study:

. . . .

2. Before training, the Drivotrainer boys exceeded the Drivotrainer girls in general driving knowledge scores.
3. Before training, boys in both groups exceeded the girls in their respective groups in specific driving knowledge scores.
4. After training, no significant differences in driving attitude scores existed between or within the Drivotrainer and dual control groups.
5. After training, no significant differences in general driving knowledge scores existed between or within the Drivotrainer and dual control groups.
6. After training, the Drivotrainer and dual control groups were comparable with respect to specific driving knowledge scores.
7. After training, Drivotrainer boys exceeded significantly the Drivotrainer girls in specific driving knowledge scores.

. . . .

11. In general, both Drivotrainer and dual control groups changed significantly in a positive direction in mean specific driving knowledge scores. However, the mean change for boys was far less significant than for girls.
12. The median road test scores between total Drivotrainer and dual control groups was not significant. However, the Drivotrainer boys outperformed the dual control boys on this road test at the 10 per cent level of significance; and the Drivotrainer

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[39] *Ibid.*, p. 6.

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> boys also surpassed the Drivotrainer girls on this test at the 10 per cent level of significance.[40]

The conclusions reached as a result of the investigation which are pertinent to this study are:

> 1. The Drivotrainer is a device which can be used successfully to train students as adequately, or possibly better, than they are now being trained by conventional means.
>
> . . . .
>
> 5. The Drivotrainer definitely offers a given staff the opportunity to train approximately thirty per cent more students in a school year than can now be trained by conventional means. This could result in tremendous savings to the taxpayer.[41]

A 1959 report of a study in the New York City Schools by Forlano and Wrightstone evaluated the effectiveness of the Aetna Drivotrainer in a sixteen-period driver education course. The criterion measures used were: (1) a paper and pencil test used to investigate such areas as driver knowledge, emergency judgment, and driver attitude; and (2) a performance test to measure the student's ability to start a car, drive for 150 yards, and stop the car. The authors concluded that (1) no significant difference in driver knowledge, driver attitude, and emergency judgment as measured by paper and pencil tests appeared between various control and Drivotrainer groups; (2) generally, success on the Road Readiness Test tended to vary directly with length and intensity of exposure to the Drivotrainer apparatus; and (3) the Drivotrainer program is more economical.[42]

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[40] Ibid., p. 7-8.

[41] Ibid., p. 9.

[42] George Forlano and J. Wayne Wrightstone, An Evaluation of the Aetna Drivotrainer in Selected New York City High Schools (Divisional Bulletin No. 3; New York: State Board of Education, Bureau of Educational Research, October, 1959), p. 13.

Bishop conducted a study in 1963 "to determine whether sufficient transfer of learning occurs from simulator instruction to actual driving to permit substitution of such experience for part of the required behind-the-wheel teaching."[43] Four groups of fifty students each were selected in a random manner from 1,250 tenth and eleventh grade students at Andrew Jackson High School, Jacksonville, Florida.

A summary of hours for the four groups is as follows:[44]

	Simulator Instruction	On-the-Road Instruction	Car Observation
Group A	0	6	6
Group B	12	3	6
Group C	0	3	6
Group D	0	0	0

The evaluation instruments used in the study were: (1) a knowledge test for use with the Sportsmanlike Driving textbook,[45] (2) the Siebrecht Attitude Scale,[46] and (3) the McGlade Road Test for driving performance.[47]

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[43] Richard W. Bishop, Evaluating Simulator Instruction for Accomplishing Driver Education Objectives (Tallahassee: Florida State Department of Education, July, 1963), p. 1.

[44] Ibid., p. 4.

[45] Driving Knowledge Test (Washington: American Automobile Association, 1956).

[46] Elmer B. Siebrecht, Siebrecht Attitude Scale (New York: New York University, Center for Safety Education, 1941).

[47] Francis S. McGlade, A New Road Test for Use in Driver Licensing, Education and Employment (New York: New York University, Center for Safety Education, 1961).

A significant difference in knowledge improvement at the .01 level was found between the simulator group (Group B) and each of the other groups in favor of Group B.[48] Also, there was a significant difference in Road Performance at the .05 level between Group A and Group C in favor of Group A. No significant difference at the .05 level was found between Group A and Group B, although Group B had a lower mean score that approached significance in favor of Group B.[49] An item analysis of the McGlade Road Test[50] indicated that Group B's most significant transfer occurred in three very important factors affecting the driving task: (1) intersection observance, (2) intersection speed, and (3) speed control.[51]

The following general conclusions reached as a result of the investigation were:

> The findings of this study indicate that a program combining 12 hours of simulator experience as applied in this study with 3 hours behind-the-wheel taught by a competent instructor compares favorably with the conventional 6 hours behind-the-wheel also taught by experienced instructors.[52]

In 1965, Hayes, Porter, Saja, and Stehman reported on a study in Pennsylvania which compared two types of simulator (Allstate Good Driver Trainer) courses with the traditional type of program. The study had the following objectives:

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[48] Bishop, _op. cit._, p. 9.

[49] _Ibid._, pp. 11-12.

[50] McGlade, _loc. cit._

[51] Bishop, _op. cit._, p. 17.

[52] _Ibid._, p. 18.

1. Will the driving skills, driving knowledge, and attitude toward driving differ significantly between students taught by a simulator centered course and those taught by a dual-control car centered course?

2. In which specific areas of learning does the simulator centered course produce significantly different results compared to a dual-control car centered course?

3. Will there be a significant difference in results due to sex?[53]

The investigation showed:

> It was indicated that the integrated simulator approach did a significantly better job of preparing students for their fourth and final periods of dual-control car training than did either the non-integrated simulator or the non-simulator methods. In the foregoing area of driving skills the difference in means was not significant between students taught by the non-integrated simulator method and those taught by the standardized, conventional car program (non-simulator). Overall there was no significant difference among treatments in passing the State license examination or in traffic accidents for the first six months of driving. The integrated simulator method produced significantly better results than did the non-simulator approach in the specific skills involving road position, turn signals and intersections and in knowledge of stopping, night speed, headlights, and passing.
>
> The differences between final means on a locally-devised knowledge test were statistically significant in favor of both the integrated simulator and the non-simulator treatments compared with the non-integrated simulator approach. The integrated simulator group had the highest means on both the 1962 AAA Knowledge Test and the Siebrecht Attitude Scale but these results were not statistically significant compared with the means of the other two groups.
>
> . . . Girls taught by the integrated simulator method made significantly fewer errors in the car training phase than did girls taught by the other two methods. Also the integrated simulator girls had significantly less skills error variance than did the non-simulator girls. Sex was the most important pre-experimental

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[53] Robert B. Hayes and others, Immediate Standardized Learning Reinforcement to a Complex Mental-Motor Skill (Driver Training) Using Electronically-Coordinated Motion Pictures (Abstract, Title VII Project No. 1090; Washington: U. S. Department of Health, Education, and Welfare, 1965), p. 1.

> variable. The average girl apparently commences driver training at a much lower point on the skills continuum than does the average boy.[54]

It further indicated:

> With an integrated teaching approach the new simulator with its immediate learning reinforcement can be used to substitute nine hours of simulated training for three of six hours of behind-the-wheel and three of six hours of observation in a dual-control car. With proper scheduling to take advantage of an improved student-teacher ratio the new simulator could increase by 60 percent the number of students trained per instructor per year.[55]

Many instructors with experience in simulation have become advocates of its use and report that benefits, such as recognition of hazards, decision making, and performance, have a positive influence on the driving task. Research strongly supports the premise that a transfer of learning occurs from the simulator environment to the actual task.[56]

The off-street multiple car driving range first came into existence in 1936 at Lane Technical High School in Chicago.[57] Under the leadership of Graham, the Detroit School District developed its first such facility at Pershing High School in 1944.[58] Michigan State

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[54] Ibid., p. 2.

[55] Ibid.

[56] Richard W. Bishop, "Questions and Answers About Driving Simulators," Safety Education (December, 1964), p. 10.

[57] Automotive Safety Foundation, The Multiple Car Method (Washington: Automotive Safety Foundation, March, 1967), p. 1.

[58] Herbert J. Stack, History of Driver Education in the United States (Washington: National Education Association, National Commission on Safety Education, 1966), p. 35.

University developed its range in 1956. While the off-street multiple car driving range program was slow to achieve recognition, its utilization in the last decade has increased considerably. The latest report from the Insurance Institute for Highway Safety shows that 464 schools in 28 states utilized this method of instruction to teach nearly 154,000 students during the 1967-68 school year.[59]

The off-street multiple car driving range should not be confused with parking lots, athletic fields, or similar areas which do not provide adequate space or experiences. These areas are sometimes used in early lessons by dual-control cars each occupied by an instructor and students. This does not mean that parking lots, athletic fields, and similar areas cannot be useful and effective areas for instruction. Many excellent ranges are so located, but they provide the necessary space, design, and experiences that students need. They also provide for the following distinctive features of the true multiple car method: "(a) more cars than teachers are functioning at the same time, and (b) students are instructed by a teacher positioned outside the vehicle."[60]

Range instruction offers a broad potential to schools desiring to strengthen their driver and traffic safety education programs. Properly taught, it transfers the emphasis from teaching to learning.

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[59] Insurance Institute for Highway Safety, 21st Annual Driver Education Achievement Program, 1967-68 School Year (Condensed Report; Washington: Insurance Institute for Highway Safety, 1968).

[60] Automotive Safety Foundation, *op. cit.*, p. 4.

In an address to the Seventh Annual Conference of the American Driver and Traffic Safety Education Association, Nolan said:

> . . . perhaps the outstanding feature of the multiple car, off-street driving range is that it places high priority on the acceptance of responsibility and on cooperation with one's fellows. In addition, youngsters learn to adjust to various road and weather conditions. A student driver must communicate with other student drivers while on the range. When the student is alone in the car, we have a real situation in which to test his driving behavior.[61]

An examination of schools which have adopted range instruction as one component of their driver and traffic safety education programs reveals a wide variation among the number of hours of on-street instruction required in addition to that on the range, as well as the number of hours of range instruction deemed equivalent to on-street instruction. These differences result from variances among philosophies on range instruction, size and design of the range, different combination of programs, state standards, and other factors. The Fourth National Conference on Driver Education recognized these variances in recommending that:

> . . . experience on a multiple-car driving range be supplemented by one or more hours of practice driving under real traffic conditions in a dual-control car. In the absence of a sufficient amount of investigation and experience in this area, it is not feasible to recommend a definite ratio between time on a multiple-car driving range and time for on-street practice in a dual-control car.[62]

The Four-Phase Program, as commonly designated, combines instruction in classroom, simulators, off-street multiple car driving ranges, and on-street instruction into a correlated and integrated program extending through a school semester. The first evidence of such a program in operation was during the Spring Term of 1957 at Michigan State University.[63] The program provided approximately forty-five hours classroom, five hours simulation, six hours range, and one and one-half hours on-street instruction.[64] White Plains High School in New York has offered a similar program since 1959;[65] however not all the course components were offered during the same school term. The term, Four-Phase Program, was initially applied by the Brevard County Public Schools in Florida in conjunction with its development of a program embodying these components in 1963.[66] At about this same time, the Jefferson County Public Schools in Colorado developed a similar program.[67] Currently there are 150 four-phase programs in sixteen states.[68]

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[61] National Commission on Safety Education, Seventh Annual Conference Proceedings of American Driver and Traffic Safety Education Association, June 26-28, 1963 (Washington: National Education Association, National Commission on Safety Education, 1964), pp. 35-36.

[62] Fourth National Conference on Driver Education, Policies and Practices for Driver and Traffic Safety Education (Washington: National Education Association, National Commission on Safety Education, 1964), p. 24.

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[63] Information obtained from a conference with Robert O. Nolan, Highway Traffic Safety Center, Michigan State University.

[64] Robert O. Nolan, "East Lansing Combines Drivotrainer and Range Plan Program in Second Year," Drivotrainer Digest, Vol. III, No. 2 (April, 1960), pp. 3-4.

[65] "City Officials Visit White Plains High School," Drivotrainer Digest, Vol. VI, No. 1 (May, 1963), pp. 8-9.

[66] Charles E. McDaniel, "A Four-Phase Driver Education Program, 1964 National Safety Congress Transactions (Vol. XXIII; Chicago: National Safety Council, 1964), pp. 51-55.

[67] "Jefferson County, Colorado Combines Driving Range, Behind-the-Wheel and Simulators in Unique Driver Education Program," Rockwell Safety News, Vol. II, No. 1 (Winter, 1964), pp. 10-13.

[68] Insurance Institute for Highway Safety, 20th Annual Driver Achievement Program, 1966-67 School Year (Washington: Insurance Institute for Highway Safety), p. 27.

In 1965, Brazell reported on a study which evaluated accident and violation records of students in Dearborn, Michigan, who had received instruction in one of four different laboratory programs - all on-street instruction, all range instruction, range plus one hour on-street instruction, or simulator plus on-street instruction.[69] Three findings of the Dearborn investigation were:

1. The on-street method, generally considered to be the most expensive, did not yield superior driving results in terms of the criteria of this study.
2. Off-street methods, usually considered to be the least expensive, produced at least comparable results compared with other methods.
3. Students trained under simulator methods showed approximately equal accident records but more moving-violation points per 1,000 months of driving exposure, when compared with students trained under non-simulator methods.[70]

Bishop in a 1965 study, which compared the effectiveness of on-street and multiple car driving range instruction, reported:

> Four groups of students, each receiving different instructional treatments, were compared in this project. Group A received the traditional 6 hours on street; Group B received 6 hours instruction under the multiple-car driving range method; Group C received 1 hour on-street and 6 hours of multiple-car driving range experience; and Group D received 2 hours on-street and 6 hours on the multiple-car driving range.[71]

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[69] Robert E. Brazell, "A Follow-Up Study of Public School Driver Trainees, Relating Driving Performance Records to Selected Academic and Training Factors" (unpublished doctoral dissertation, University of Michigan, 1961), p. 19.

[70] *Ibid.*, p. 95.

[71] Richard W. Bishop, "Comparing the Effectiveness of Various Combinations of On-Street and Multiple Car Driving Range Instructional Hours" (unpublished research study, Florida State Department of Education, Tallahassee, 1965), p. 9.

> . . . all students received a minimum of 30 hours of classroom instruction.[72]

The results of the investigation indicate that under the conditions of the study, a traditional program of six hours on-street instruction is not significantly superior to either of the three off-street multiple car driving range programs.[73]

A 1965 study by Nolan evaluated the relative effectiveness of students taught to drive by means of the Drivotrainer and those taught to drive on the multiple car off-street driving range. A driver-attitude test, driver-knowledge test, and driving skill test were used as criterion measures.[74] Students in the simulator group received ten clock hours of Drivotrainer instruction supplemented by three hours behind-the-wheel and six hours observation in a dual-control car. Students in the range group received ten clock hours of off-street multiple car driving range instruction plus two hours behind-the-wheel and four hours observation time in a dual-control car.[75]

The following are results of his investigation which are pertinent to this study:

. . . .

> 4. After instruction no significant differences in general driving knowledge scores existed between the Drivotrainer and multiple car groups.

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[72] Ibid., p. 11.

[73] Ibid., p. 17.

[74] Robert O. Nolan, "A Comparative Study of the Teaching Effectiveness of the Multiple Car Off-Street Driving Range and the Aetna Drivotrainer" (synopsis of an unpublished doctoral dissertation, Michigan State University, 1964), pp. 1-2.

[75] Ibid., pp. 8-9.

5. After instruction the Drivotrainer and multiple car boys had significantly better general driving knowledge scores than the Drivotrainer and multiple car girls.

. . . .

7. After instruction the Drivotrainer and multiple car groups were comparable with respect to specific driving knowledge scores.

. . . .

11. Both Drivotrainer and multiple car groups made significant positive mean changes in general driving knowledge.

12. Both Drivotrainer and multiple car groups changed significantly in a positive direction in mean specific driving knowledge scores. However, the mean change for the second semester Drivotrainer and multiple car groups was far more significant than that for the first semester Drivotrainer and multiple car groups.

13. After instruction the differences in mean road test (vehicle handling) scores between the Drivotrainer and multiple car groups were not significant. However, the Drivotrainer boys out performed the Drivotrainer girls at the .02 level of significance.

14. After instruction the differences in mean road test (road problems) scores between the Drivotrainer and multiple car groups were not significant. However, the Drivotrainer boys again out performed the Drivotrainer girls at the .02 level of significance.

. . . .

17. The low correlations obtained for the Drivotrainer and multiple car groups when comparing intelligence and final road test scores were not significant.[76]

A study by Gustafson in 1965 compared the effectiveness of instruction in the Allstate Good Driver Trainer and on the multiple car off-street driving range with the multiple car off-street driving range. The purpose of his investigation was:

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[76] *Ibid.*, pp. 12-14.

1. To determine whether students who were taught to drive by means of a combination program involving use of the Allstate Good Driver Trainer and the multiple car off-street driving range were comparable in driving knowledge, attitude, and skill with students who were taught on the multiple car off-street driving range exclusively; and

2. To determine whether students who were taught to drive by means of a combination program involving use of the Allstate Good Driver Trainer and the multiple car off-street driving range with some additional on-the-street instruction were comparable in driving knowledge, attitude, and skill with students who were taught on the multiple car off-street driving range, with the same additional on-the-street instruction.[77]

The combination simulator/range program (experimental group) consisted of six hours of instruction in the simulator correlated with four hours of instruction on the range. This instruction was followed by two hours of observation and two hours of instruction on-the-street. The range program (control group) consisted of ten hours of instruction on the range followed by two hours of observation and two hours of instruction on-the-street.[78]

Findings of the Gustafson investigation pertinent to this study are:

1. On the pre-tests (before the simulator and/or range instruction) there were no significant differences between the experimental and control groups in general driving knowledge, specific driving knowledge, or in driving attitude.

2. On the mid-tests (after the simulator and/or range instruction) there were no significant differences between the experimental and control groups in general driving knowledge, specific driving knowledge, driving attitude, or on the simulator driving test. On the range skill tests, however, there was a significant difference in favor of the control group.

3. Between the pre- and mid-tests both the experimental and control groups showed significant improvement in general driving knowledge, specific driving knowledge, and on the Siebrecht Attitude

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[77] Robert E. Gustafson, "A Study to Compare the Effectiveness of Instruction in the Allstate Good Driver Trainer and on the Multiple Car Off-Street Driving Range with the Multiple Car Off-Street Driving Range" (an abstract of an unpublished doctoral dissertation, Michigan State University, 1965), p. 1.

[78] *Ibid.*, p. 2.

Scale. No significant improvement was shown for either group on the Mann Personal Attitude Survey.

4. On the post-tests (after the on-the-street instruction) there were no significant differences between the experimental and control groups in general driving knowledge, specific driving knowledge, driving attitude, or on the traffic problems and road problems sections of the final road test. There was a significant difference, however, on the vehicle handling section of the final road test in favor of the control group.

5. Between the mid-and post-tests neither the experimental or control groups showed significant improvement in general driving knowledge, on Part I of the specific driving knowledge test, or on the Mann Personal Attitude Survey. Significant improvement was shown by the control group on Part II of the specific driving knowledge test, and by the experimental group in the Siebrecht Attitude Scale.

6. Between the pre- and post-tests both the experimental and control groups showed significant improvement in general driving knowledge, specific driving knowledge and on the Siebrecht Attitude Scale. Neither group showed significant improvement on the Mann Personal Attitude Survey.[79]

Seals in a 1966 study compared a traditional course (Group I), a three-phase course - classroom, simulator, on-street (Group II), and two variations of a four-phase course (Groups III and IV) in driver and traffic safety education (see Figure 1 for a time allotment and scheduling order of various phases of driver and traffic safety education) in terms of student achievement on driving knowledge and road performance tests.[80]

A pre- and post-knowledge test, and a road performance test, were used as the evaluation criteria.

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[79] *Ibid.*, pp. 3-4.

[80] Thomas A. Seals, "An Evaluation of Selected Driver and Traffic Safety Education Courses" (unpublished doctoral dissertation, Florida State University, August, 1966), pp. 36-37.

The following conclusions were reached as a result of the investigation:

1. Pre-test for driving knowledge.
    a. The student groups assigned to the four instructional treatments did not differ significantly in mean pre-test scores for driving knowledge.
2. Post-test for driving knowledge.
    a. Each of the four instructional treatments apparently produced a significant improvement in driving knowledge as measured by an objective test.
    b. There was no significant difference between mean scores made by Group I and Group II.
    c. There was no significant difference between mean scores made by Group I and Group III.
    d. There was no significant difference between mean scores made by Group I and Group IV.
    e. There was no significant difference between mean scores made by Group III and Group IV.
    f. There was a significant difference between mean scores made by Group II and Group III in favor of Group III.
    g. There was a significant difference between mean scores made by Group II and Group IV in favor of Group IV.
3. Post-test for road performance.
    a. There was no significant difference between mean scores made by Group I and Group III.
    b. There was no significant difference between mean scores made by Group I and Group IV.
    c. There was no significant difference between mean scores made by Group III and Group IV.
    d. There was a significant difference between mean scores made by Group I and Group II in favor of Group I.
    e. There was a significant difference between mean scores made by Group II and Group III in favor of Group III.

   f. There was a significance between mean scores made by Group II and Group IV in favor of Group IV.

4. Correlation between post-test scores for driving knowledge and post-test scores for road performance.

   a. No significant correlation existed between the study population's post-test scores on the driving knowledge examination and the study population's post-test scores on the McGlade Road Test.[81]

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[81] *Ibid.*, pp. 62-64.

FIGURE 1

TIME ALLOTMENT AND SCHEDULING ORDER OF VARIOUS PHASES OF DRIVER AND TRAFFIC SAFETY EDUCATION[82]

Phase of Instruction	Instructional Treatment Number			
	I	II	III	IV
Classroom Instruction	40 hours	40 hours	30 hours	30 hours
Simulation Equipment	0 hours	0 hours	10 hours	10 hours
Off-Street Multiple Car Driving Range	0 hours	5 hours	5 hours	5 hours
In-Car Observation, Off-Street Multiple Car Driving Range	0 hours	5 hours	5 hours	5 hours
On-Street Instruction Behind-the-Wheel	6 hours	1 hour	1 hour	2.5 hours
In-Car Observation, On-Street Instruction	12 hours	2 hours	2 hours	5 hours
Supervised Study	2 hours	7 hours	7 hours	2.5 hours
Total	60 hours	60 hours	60 hours	60 hours

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[82] Ibid., p. 38.

CHAPTER III

PROCEDURES

The results of any investigation are dependent to a large measure on the procedures adopted. Well-defined procedures give direction to the researcher. They guide him in making decisions during the course of the investigation. Procedures should be meaningful, based on sound principles and clearly stated.

The procedures adopted for this study are presented as "tasks" or "sub-problems." The following is a brief description of each task or sub-problem:

1. Selecting a school large enough in student population to provide a statistically sound study sample.
2. Providing a staff of instructors with the necessary competencies to provide equivalent and quality instruction in the different instructional treatment groups.
3. Developing standardized procedures and lesson content for student instruction.
4. Providing the necessary facilities and equipment to conduct the study.
5. Creating an experimental design to compare the relative effectiveness of four selected laboratory programs and three selected classroom programs, and to determine the significance of the sex factor.
6. Assigning students randomly to each of the different instructional treatment groups.

7. Assigning instructors to the different phases of instruction.
8. Selecting and/or developing valid and reliable measurement instruments and standardizing procedures for administering the tests.
9. Collecting and applying statistical treatment of the data.

Sub-Problem One - Selecting a school large enough in student population to provide a statistically sound study sample.

Several possible locations were investigated and evaluated. Answers to the following questions were considered the evaluative criteria for selection of the study site.

1. Is the school district willing to cooperate with the Office of the Superintendent of Public Instruction in conducting the study?
2. Does the school district offer driver and traffic safety education as a part of the regular school day program?
3. Does the school district require driver and traffic safety education for graduation?
4. Does the school district have a school or schools in close proximity to each other which have enough students in the tenth grade to provide a statistically sound study sample?
5. Does the school district encourage the use of innovative techniques of instruction in driver and traffic safety education?
6. Does the school district have simulators, a drivocator system, an off-street multiple car driving range, and other necessary facilities and equipment to provide for effective instruction?
7. If the school district does not have this equipment or these facilities, would space be made available for them?

8. Is the school district able to provide an adequate number of automobiles, textbooks, and other needed equipment and supplies for the study?
9. Is the school district able to provide an adequate number of instructors to conduct the study?
10. Is the school district able to provide adequate classrooms and office space to conduct the study?
11. Is the school district willing to schedule all tenth grade students into driver and traffic safety education from January 1, 1968, until the end of that school year?

Renton High School, Renton, Washington, was selected for the study. Renton was the largest high school in the state and had a sophomore class of over nine hundred students. One of the major considerations in the selection of a school or school district for the study was the availability of a large number of tenth grade students for driver and traffic safety education after January 1, 1968. A large number of students was necessary to provide a statistically sound study sample because of the number of different instructional treatment groups being considered. It was felt that an absolute minimum of fifty students should be required for each instructional treatment group, although seventy-five students for each instructional treatment group would be desirable.

Renton High School offered driver and traffic safety education during the school day and required successful completion of the course for graduation. Renton School District had also shown a willingness to use different innovative techniques of instruction in its driver and safety education programs. The district had purchased a mobile simulator and a forty-place drivocator system, in addition to other types of audio-visual equipment. The district was further planning to construct an off-street multiple car driving range in the near future. Adequate space for equipment, classroom, planning, and offices was similarly made available. Arrangements were made for an adequate number of automobiles, textbooks, and supplies. The school district was very receptive to the idea of cooperating with the Office of the Superintendent of Public Instruction and pledged its support of the project. The district was able also to provide the additional teachers needed to conduct the study.

The school district also agreed to free all driver and traffic safety education instructors from September, 1967, to January, 1968, for the purpose of participating in an in-service education program. The district further agreed to schedule all tenth grade students into driver and traffic safety education from January 1, 1968, until the end of the school year. This was important for two reasons: (1) time was needed to conduct the in-service education program, to develop and agree on procedures and lesson plans, to construct an off-street multiple car driving range, to purchase a second simulator, and ready all equipment to be used in the investigation; and (2) it was important that all students involved receive instruction during the same period of time to reduce the number of variables and insure as much uniformity of instruction as possible.

In addition to being the largest high school in the State of Washington, Renton High School is located near the Boeing Aircraft

Company whose employees represent all parts of the country, as well as various socio-economic levels. This situation gave the study sample a broad cross-section of students from various types of homes and with varied experiences, which typifies the population of the state.

Sub-Problem Two - Providing a staff of instructors with the necessary competencies to provide equivalent and quality instruction to the different instructional treatment groups.

Renton High School possessed a staff of six driver and traffic safety education instructors. However, a total of thirteen instructors was needed to conduct the study. The additional instructors were needed because of the number of different instructional treatment groups in the study, and because all tenth grade students would be taught during the same period of time. The additional instructors were provided by the personnel office of the Renton School District. There was no control in their selection by the Research Division of the Office of the Superintendent of Public Instruction.

The instructors were found to possess a wide range of teaching experience, from four to forty years, of which zero to twenty-two years were spent teaching driver education (see Appendix D). All met the certification requirements for teaching driver education in the State of Washington.[1] All instructors had no, or limited, experience in the teaching techniques used in simulators, off-street multiple car driving ranges, and the drivocator system.

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[1] Certification requirements obtained from the Certification Division, Office of the Superintendent of Public Instruction, Olympia, Washington.

During the time from September 6, 1967, to December 21, 1967, the Project Director and Assistant Director conducted an in-service education program to provide the instructors with the necessary philosophical background and teaching techniques to perform this phase of the investigation. Each received both instruction and practical application of the techniques to be used in the simulator, off-street multiple car driving range, and drivocator phases of instruction. Renton junior and senior students who had previously taken the classroom phase of the program were used in the laboratory phases of the in-service education program. Some junior and senior students also received some classroom instruction with emphasis in the techniques used in drivocator instruction. Consultants from the Aetna and Allstate Insurance Companies, which developed and produced the simulator and multi-media films, were used during the in-service simulator and drivocator instruction phase of the program.

The in-service education phase of the program also included the development of and agreement on techniques and procedures to be used by students and instructors in the various phases of the laboratory program. During this time, consensus of content sequence in the different phases of instruction was also reached by the instructional staff.

Sub-Problem Three - Developing standardized procedures and lesson content for student instruction.

This was vital in order to reduce the number of variables as much as possible. The development of a set of driving procedures (see Appendix A) was necessary for standardization of instruction, since a driving guide published by a textbook company was not used. It was the opinion of the staff that the driving procedures in the student textbook were not adequate since some discrepancies appeared in the procedures used in the two simulators. The prior teaching experience and practices of the Renton High School driver and traffic safety education staff also differed from those expressed in the student text. Committees of instructors were used to develop draft copies of the procedures. These were critically reviewed and revised by the entire staff until agreement was reached. The driving procedures were then duplicated and given to the instructors and students prior to their use in the classroom and laboratory phases of instruction.

A set of teaching points (see Appendix A) was developed to supplement the driving procedures. These provided additional information and cited certain aspects of the driving procedures which should be stressed to students, and were used only by instructors.

Beginning drivers often have problems in effecting a transfer between the classroom and laboratory experiences, especially if they have not had a similar experience in the laboratory phase of instruction. Students are sometimes confronted with situations in which they have had no previous knowledge or information on the subject imparted to them. These situations present obstacles to the students because they are unable to establish meaningful relationships between the different phases of instruction.

In an effort to make the course more interesting and meaningful to students and instructors, a novel approach to classroom and laboratory content was used in the Washington Driver and Traffic Safety Education Project. The course content was designed to provide (1) a thorough integration and correlation of learning experiences from one phase of instruction to another, and (2) a systematic analysis of the essential elements pertaining to different types of driving experiences.

The correlated and integrated approach was implemented throughout the instruction. Students were alternated between classroom and laboratory instruction during treatment of a particular type of driving environment. They received classroom instruction concerning a particular skill, concept, or driving situation prior to, or concurrently with, the laboratory phase of instruction. A progression of understanding and skills, manipulative and perceptual, was developed through a process from classroom to simulator, to the range, and finally to the on-street phase of instruction. Students in the different laboratory programs followed a sequential progression of skills, regardless of the type of laboratory program to which they were assigned. A progression of laboratory lessons, which included the necessary understanding and skills, was developed to correlate with the classroom lessons (see Appendix B for a progression of lessons for the four different laboratory programs).

The classroom phase of instruction was developed around (1) an overview of the traffic problem - how it relates to and affects the student, both today and in his future driving; (2) five different types of driving experiences - residential, light city, highway, heavy city, and expressway; and (3) a summary focusing on the role of the well-informed traffic citizen. A systematic analysis of the essential elements of driving was applied to the different types of driving experiences. In the light of this, published driver and traffic safety education course content was classified and reviewed. Those content segments which best applied to a particular driving experience were then extracted and placed in their proper context within the most pertinent type of driving experience. Selected and treated within the respective experimental categories, as most applicable, were content subjectival facets such as engineering, enforcement, laws of nature, man-made laws, stopping distances, driving procedures, perceptual skills, health, effects of alcohol, and driving emergencies. For example, force of impact and centrifugal force were discussed in the highway driving unit instead of the unit on residential driving, because they were more applicable to the higher speeds and types of roadways. The principles of traffic engineering were discussed in all units. Other content aspects of driving, such as trip planning and preventive maintenance, were placed in only one or two of the units. Thus, an instructional unit for each of the five types of driving experiences was developed.

Three individual sets of on-street lesson plans were developed for instructional application to the standard (6 hours), simulator and range (3 hours), and four-phase (2 hours) laboratory programs, respectively. All, however, were designed to provide similar driving experiences. The lessons and their routes were engendered through staff group process and duplicated for each instructor (see Appendix B). They were coded by a program designation - standard "B," simulator and range "C," and four-phase "A"; and a trip number "1-18." This code was necessary for scheduling and specifying the specific on-street lesson to be taught a particular student. Three students were assigned to a driving group. If one was absent, the two remaining students drove for the entire period. When the absentee returned, he was required to make up both the lesson(s) missed and the driving time lost. Instructors were not permitted to take only one student out for a lesson.

In like manner, the simulator films (see Appendix B) were evaluated for content and selections were made for the two types of simulator programs. The simulator and on-street programs utilized all or part of thirteen films to be shown in the twelve lessons. The four-phase program utilized eleven films to be shown in the eight lessons. Similar films from the two types of simulators were matched.

After the simulator instructors were selected, they critically analyzed and evaluated the films to determine where planned stops of the films should be made, what supplemental information, if any, should be presented, and/or what concepts should be treated during the film stops. The simulator films were coded in a similar manner as the on-street lessons, except for an "S" to designate a simulator lesson on the daily lesson schedule.

The off-street multiple car driving range lessons (see Appendix B) were developed to provide a progression of skills and concepts. Whenever possible, a particular skill was taught on the range immediately following instruction in the simulator; but in all cases was taught prior to on-street instruction. For example, students were shown the instructional film on passing in the simulator prior to practicing the passing maneuver on the range, and prior to passing other cars in the on-street phase of instruction, except for situations in residential and light city traffic. Range lessons were coded similar to the on-street lessons, except for an "R" used on the daily schedule to designate that it was a range lesson.

Sub-Problem Four - Providing the necessary facilities and equipment to conduct the study.

A considerable variety of facilities and equipment was needed. Excellent cooperation in providing the necessary facilities and equipment was lent by both the Renton School District and the Office of the State Supervisor of Driver and Safety Education Programs.

The Renton School District was responsible for providing and/or making arrangements for the following facilities and equipment:

1. A copy of the text, Sportsmanlike Driving,[2] Fifth Edition, for each student.
2. Twenty-two automobiles, all of which were provided (nine Oldsmobiles, four Fords, four Dodges, three Chevrolets, and two Ramblers). Each was a standard size, four-door sedan equipped with power steering, power brakes, heater and defroster, two side-view mirrors, hydraulic dual brake, and a seatbelt for each occupant. Eighteen of the automobiles were equipped with AM-FM radios for use on the range. Maintenance, refueling, and storage of the automobiles were also provided.
3. A number of different size and types of rooms were required. Office and work space were provided in a portable classroom.

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[2] American Automobile Association, Sportsmanlike Driving (Fifth Edition; Washington: McGraw-Hill Book Company, 1965).

Three classrooms and storage space also were provided in portable classrooms. One of these classrooms was equipped with a forty-place drivocator installation. A large, one-hundred-seat, study hall was provided for driver and traffic safety education students not scheduled for classroom or laboratory instruction. Office space for the Project Director and Assistant Director was provided at the Renton Vocational-Technical School.

4. A sixteen-place Allstate Good Driver Trainer simulator, equipped with a complete set of films, instant error identification panels on units, and a printer, was likewise made available.

The Office of the Superintendent of Public Instruction was responsible for providing and/or making arrangements for the following facilities and equipment:

1. A fire extinguisher, first-aid kit, two flares, and an inside instructor's mirror for each car in the on-street phase of instruction. Two sets of the above equipment were provided for use on the range.
2. Two simulator installations were needed for the study. A twelve-place Aetna Drivotrainer simulator, equipped with a complete set of films, instant error identification panel on units, and a printer was leased for the study.
3. The Office of the Superintendent of Public Instruction constructed an off-street multiple car driving range on land owned by the Renton School District. The range was designed by the Project Director. Bidding was handled by the Renton School District. The range is 320 feet wide, 457 feet long, with an additional

area for hill and expressway exercises. The range affords a wide variety of skill developmental and simulated traffic experiences, as described elsewhere (see Appendix E). It is of a size and embodies a number of experiences adequate for accommodating twenty cars at one time although only twelve cars were used simultaneously in the conduct of this aspect of the investigation. The instructor communicated with each automobile via an FM transmitter and was received in each car through an FM radio.

4. One of the experiences planned for each student was that of pulling a trailer in one or two of the on-street lessons. Five trailers and trailer hitches were provided by the U-Haul Company of Washington. Trailer operating booklets were also provided for each student.
5. Range equipment such as signs, car numbers, cones, and barricades, was provided jointly by the Renton School District and the Office of the Superintendent of Public Instruction. A number of different types of audio-visual equipment and the supplies which were utilized were similarly supplied.

Sub-Problem Five - Creating an experimental design to compare the relative effectiveness of four selected laboratory programs and three selected classroom programs, and to determine the significance of the sex factor.

The laboratory programs consisted of (1) a standard program with six hours on-street instruction; (2) a simulator program with twelve hours simulator and three hours on-street instruction; (3) a range program with six hours range (eight lessons) and three hours on-street instruction; and (4) a four-phase program with eight hours simulator, six hours range (eight lessons), and two hours on-street instruction.

Selection of the laboratory programs was based on the following rationale. The program to which the term, standard, is commonly applied, consisting of six hours on-street instruction in a dual-control automobile, is the program currently most prevalent in schools. It therefore required selection, per se. The 1964 report of Policies and Practices for Driver and Traffic Safety Education was used as a criterion for determining the simulator program.[3] As recommended in this source, twelve hours simulation were given in lieu of three of the six hours on-street instruction. In the consideration of establishing the four-phase and range programs, another source, The Multiple-Car Method, has suggested a combination of eight hours simulation, six hours range, and two hours on-street instruction as a reasonable and practical four-phase program.[4] In order to compare the relative effectiveness of range instruction and simulator instruction, the range program also used three hours on-street instruction to keep both programs constant in this respect. Six hours range instruction - identical to the amount of range instruction hours provided in the four-phase program - was similarly retained to further reduce the number of variables to a minimum.

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[3] Fourth National Conference on Driver Education, Policies and Practices for Driver and Traffic Safety Education (Washington: National Education Association, National Commission on Safety Education, 1964), p. 23.

[4] Automotive Safety Foundation, The Multiple-Car Method (Washington: Automotive Safety Foundation, March, 1967), p. 6.

No ratio of range to on-street hours was employed for determining the number of hours in the range program. Conversely, effort was made to avoid any ratio. Off-street multiple car driving range instruction, it is felt, does not appear to lend itself to the establishment of ratios. If minimum standards for course approval need be established, it is deemed well to consider as criteria such factors as size of the range, number and types of different experiences (both skill and perceptual), space and distance provided for various maneuvers and simulated traffic experiences, safety features embodied in the design of the range, number of vehicles the area can effectively use, adequacy of the communication system, and effectiveness of the instructor operating the range. In assessing the effectiveness of the range instructor the following factors are felt to require consideration:

1. Does he have control of the range?
2. Are his instructions to students simple and clear?
3. Does he have lesson plans which provide for a sequential progression of skills?
4. Does he have empathy for the problems of students on the range?
5. Does he consider the safety factors involved in range operation?

There have been a number of studies which have examined laboratory instruction, but very little research which examines the classroom phase of instruction has been conducted. This investigation, in part, treats this most important part of instruction. The classroom programs selected for consideration consisted of (1) thirty hours classroom instruction, (2) thirty hours classroom instruction plus fifteen hours drivocator instruction, and (3) forty-five hours classroom instruction.

Selection procedures for the three clasroom programs embodied a rationale similar to that of the laboratory programs. The thirty hours classroom program was selected because it is currently the most prevalent in schools. Many instructors of driver and traffic safety education have voiced the opinion that thirty hours classroom instruction is not adequate to cover the material which students need to become safe and efficient motor vehicle operators in today's complex traffic environment. An increase in the number of classroom hours raises a number of questions. How can this time best be spent? Is an increase in the number of hours sufficient? Should the additional time be spent on the same material, or should new material be considered? Should a different teaching technique be used? Could this time be better utilized through the use of a multi-media learning system? Although it was impossible to treat all the factors indicated by the queries, as many as possible were incorporated into the study design. It was decided that the basic content for all three programs should be the same. The second classroom program added fifteen hours drivocator instruction to the basic thirty hours classroom program. The third program expanded the thirty hours teacher-centered, text-oriented instruction to forty-five hours similar instruction with no new content given to the students. The only difference was the extended amount of time given to each of the units of instruction.

Twelve different instructional treatment groups (see Appendix D) were formed, thus affording an opportunity to compare the respective programs separately or collectively for significant differences which might result through an analysis of the results obtained from the evaluation criteria.

Sub-Problem Six - Assigning students randomly to each of the different instructional treatment groups.

Renton High School employed computers to determine class schedules. Utilizing this method, students were divided as evenly as possible among the six periods of the school day for driver and traffic safety education classes. Those sophomore students who were eliminated from participation were either not 15 1/2 years old by January 9, 1968; had previously received classroom or laboratory instruction in driver and traffic safety education; were unable to obtain a driver's license because of a previous traffic violation or parental refusal to sign for the driving permit; had a physical or mental impairment which would prevent them from being able to progress satisfactorily in a regular class (this included students who had been classified as special education students by the school, and those students who had casts which would prevent normal operation of an automobile); or knew they were moving and would be in the program for only a short period of time.

The remainder of the sophomore students were placed in alphabetical order, last name first, from A to Z. Each was then assigned a number from 1 to 12, starting with the first through the twelfth student. The thirteenth on the list was again numbered "1"; the fourteenth, "2," etc., until all were assigned a number from 1 to 12. These numbers coincided with the twelve different instructional treatment groups (see Appendix D) and constituted the determining factor for assigning students to their classroom and laboratory programs.

At the conclusion of this portion of the investigation, the information and data on those students who moved during the study, or who did not have complete files of evaluation criteria were eliminated from the sample. This resulted in a total study sample of 801 students - 402 boys and 399 girls (see Appendix D).

Sub-Problem Seven - Assigning instructors to the different phases of instruction.

The Office of the Superintendent of Public Instruction did not participate in the selection of instructors. The Renton Personnel Office employed the additional number of instructors needed to conduct this phase of the investigation.

The wide range of teaching experience, age, and physical limitations were factors considered in assigning instructors to the different phases of instruction. These factors, it was felt, would not seriously affect their performance in all areas of instruction, but that they could do so in certain phases of instruction.

The assignment of range instructors represented one such serious concern. Range instruction requires a great deal of mobility and good physical condition. Two of the instructors had back and foot conditions which limited their effectiveness on the range. In addition, three instructors had no prior teaching experience in driver and traffic safety education, while still another had only taught driver and traffic safety education for two months of summer school. Although not required, teaching experience in the on-street phase of instruction is recommended prior to teaching on a range. The efficient, safe, and successful operation of a range is dependent upon the instructor being able to identify and evaluate the actions of several drivers simultaneously.

He should also be able to anticipate the actions that a student might make in his driving and be prepared to react instantaneously. Thus, range instructional competence is greatly enhanced by prior teaching experience in the on-street phase of instruction.

A second difficulty in the assignment of instructors resulted from an emergent complication in structuring the instructional procedure. The investigation of three different types of classroom programs required one more instructor than was anticipated. Furthermore, one of the instructors was available to the project for only three of the six periods each day. These factors made it necessary for the Assistant Director to teach two periods of the day.

To eliminate as many variables in instruction as possible, it was decided that two instructors would each teach three periods of simulation in the Aetna simulator and two instructors would each teach three periods in the Allstate simulator (see Appendix D). Two periods of instruction on the range were assigned to each of the three instructors (see Appendix D). Each of the simulator and range instructors taught all students receiving simulator and range instruction in the periods they were teaching in that phase of instruction.

Five instructors were assigned to teach in the classroom phase of instruction. To the degree of scheduling possible, each instructor had an equal effect on all instructional treatment groups (see Appendix D).

One of the instructors became seriously ill and died after the investigation was underway. His classes were assigned to the Assistant Director and to other instructors who had planning periods at the time, but were teaching the particular phase of instruction.

The on-street phase of instruction was taught by all instructors (see Appendix D). Instructors who taught in the other phases of instruction were also assigned students for on-street instruction. Where possible, on-street instructors were assigned students from all instructional treatment groups.

From September 5, 1967, to December 21, 1967, the Project Director and Assistant Director conducted an intensive in-service education program. During this time, all instructors were observed and evaluated in terms of their teaching strengths and weaknesses, suitability for each phase of instruction, and their adaptability to the techniques of instruction involved. Instructors were assigned so that no one phase of instruction or instructional treatment group would receive instruction superior or inferior to the others. The desires of the instructors for teaching assignments were considered, but the equal effect on all instructional treatment groups by instructors was the primary criterion used in their assignment.

Sub-Problem Eight - Selecting and/or developing valid and reliable measurement instruments and standardizing procedures for administering the tests.

Here initial consideration was given to the development of a series of tests - knowledge and road performance - which would evaluate the various segments of the driving task. However, the time available for the development of instruments of this magnitude was inadequate. Similarly, the time necessary for the administration of a series of road performance tests to all students was also considered too great.

The decision was made to use one existing test and to develop two other tests.

For testing driving performance, A New Road Test[5] was selected to determine the performance level which students had attained at the conclusion of their driver and traffic safety education program. The correlated approach of all phases of instruction made it possible for all students to complete their classroom and laboratory instruction at approximately the same time.

The McGlade Road Test, as it has become known, was developed from a study of existing driver licensing tests from forty-six states. The preliminary information was screened and evaluated by a panel of safety experts. The road test, thus devised, was then put through a series of trials to determine whether it was reliable and valid, and could be readily administered. Reliability correlation ranged from .77 to .93. The McGlade Road Test was also sensitive enough to discriminate between experienced drivers, inexperienced drivers, and chronic violators. Significance at the .01 level of confidence was found to exist between students who had received practice driving instruction and those who had not.[6]

The McGlade Road Test is a twenty-eight item test (see Appendix C) consisting of the following:

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[5] Francis S. McGlade, A New Road Test for Use in Driver Licensing, Education and Employment (New York: New York University, Center for Safety Education, 1961).

[6] Ibid., pp. 1-2.

A. Road Test Items

1. Skill Tests
    a. Prior to start
    b. Starting
    c. Backing
    d. Turnabout
    e. Park, uphill
    f. Start on upgrade
    g. Parallel park
        1) between standards
        2) by curb

2. Road Problems
    a. Right turns
    b. Left turns
    c. Traffic lights
    d. STOP signs
    e. Other type signs
    f. Lane changes

B. Driving Situations

1. Uncontrolled intersection
    a. straight through
    b. turning
2. Blind intersection

C. Road Test Area Should Include:

1. Restricted area for skill tests
2. Residential area
3. Multiple-lane roads

The course covered a minimum distance of two miles and took about twenty minutes to drive.[7]

For the purpose of this investigation, the test was evaluated as Driving Performance Test - Total and Driving Performance Test - Parts I and II. Part I included items 1 to 10, 16, 21, 26 to 28, and were considered primarily as manipulative skill items. Part II included items 11 to 15, 17 to 19, 22 to 25, and were considered as perceptual skills.

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[7] *Ibid.*, pp. 3-4.

A team of ten Washington State driver licensing supervisors, one state driver licensing examiner, twelve driver and traffic safety education instructors, and the associate supervisor of driver and safety education programs, Office of the Superintendent of Public Instruction, administered the Driving Performance Test. A two-day workshop was conducted to familiarize the examiners with the different parts and instructions included in the test manual. When questions and/or points of disagreement arose which could not be answered by the Project Director, a telephone call was made to the author of the instrument to answer these questions. Examiners were given a typed copy of the test routes (see Appendix C) and went over each route in a car without students. The examiners were then divided into two and three-man teams, consisting of both driver and traffic safety education instructors and driver licensing personnel. Each team evaluated a student not involved in the study while he drove over the test route. After returning to school, each group compared evaluations in an effort to resolve any possible differences. Each group then evaluated a second student not involved in the study and compared evaluations at the end of the trip. A standard evaluation sheet was used by all examiners (see Appendix C). The entire group of examiners reassembled to resolve any questions which might still be present concerning any part of the test.

A random assignment of students in each instructional treatment group to examiners was used. Half of the students in each instructional treatment group were examined by the driver license examiners and the other half were examined by the driver and traffic safety education instructors. The examiners were not told which instructional treatment group a student had received. They were further instructed not to ask the student what group or type of program to which he had been assigned. No driver and traffic safety education instructor examined a student he had taught in the on-street phase of instruction. The examiners were assigned students from all instructional treatment groups.

To evaluate student learning, it was decided to employ the National Test in Driver Education.[8] This is a true-false test consisting of seventy questions (see Appendix C). Sixty-four of the questions covered material usually included in driver and traffic safety education classes and textbooks. These questions relate to the various aspects of the driving task. The remaining six questions apply particularly to the State of Washington. The material contained in these questions is based primarily on information contained in the 1966 State of Washington Driver's Guide.[9]

This test was constructed on the basis of face validity. Reliability was established by a test, re-test procedure of driver and traffic safety education students in New York and Washington. A reliability coefficient of .60 to .67 was obtained. The instrument was pre-tested in the usual manner.

The test was administered to all students participating in the study before beginning (as a Pre-Knowledge Test) and after completing the course in driver and traffic safety education (Post-Knowledge Test). The directions appearing on the test booklet were read to all students and the time limit was observed. The Post-Knowledge Test was administered to the students prior to the Traffic Analysis Test and the McGlade Road Test.

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[8] National Test in Driver Education (Special Form; New York: New York University, Center for Safety Education, 1967).

[9] Department of Motor Vehicles, State of Washington Driver's Guide (Olympia, Washington: Department of Motor Vehicles, 1966).

The Pre-Knowledge Test should show if any particular instructional treatment group possessed a significantly greater amount of knowledge pertaining to the material included in a driver and traffic safety education program prior to the course. The Post-Knowledge Test should show if any particular instructional treatment group possessed a significantly greater amount of knowledge pertaining to driver and traffic safety education after taking a course in driver and traffic safety education.

The purpose of a traffic analysis test has been construed to ascertain the ability of a person to analyze a traffic accident and determine how it could have been prevented. This process involves three basic steps: (1) the person has to analyze the factors contributing to the accident, (2) the person has to determine the causes of the accident (this indicates his ability to examine the accident objectively), and (3) the person has to be able to offer a solution as to how the accident could have been prevented. To perform this function, then, a Traffic Analysis Test was constructed by the investigator.

Ahmann and Glock have recommended that essay test items be used for measuring pupil understanding.[10] The essay test is usually based on broad principles and relationships. Properly constructed, it also measures important and vital educational objectives, such as the abilities to select, organize, relate, synthesize, and apply information. Essay type questions were therefore utilized in the development of the test.

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[10] J. Stanley Ahmann and Marvin D. Glock, Evaluating Pupil Growth (Second Edition; Boston: Allyn and Bacon, Inc., 1963), pp. 177-178.

The Post-Test for Traffic Analysis was developed to obtain more than a simple feedback of knowledge. The purpose of the test is to measure a person's ability to apply his knowledge of driver and traffic safety to the driving task. The selected accident situations treated in the instrument also provide an opportunity for the person to indicate his attitude, especially in responses required as to causes of the accidents. Specifically, in terms of the Washington Driver and Traffic Safety Education Study, the Post-Test for Traffic Analysis was developed to determine if any differences resulted in a person's ability to analyze a traffic situation as a possible result of being assigned to one of four laboratory programs or one of three classroom programs.

The Traffic Analysis Test, as it emerged, constituted an extension of the "You Are the Jury" radio series which emanated from the Highway Traffic Safety Center, Michigan State University, between 1956 and 1960. In 1966, Emery evaluated program tapes of the series and selected twelve of the most common accident situations and conditions in which a car and driver became involved.[11] These programs also concerned the types of accident situations that driver education students are most interested in discussing. From these twelve, four programs were chosen for treatment in the Traffic Analysis Test, i.e., "Case of the Missing Links," "Case of the Night Freight," "Case of the Invisible Ice," and "Case of the Busy Intersection." The basic consideration in selection of the four programs was their treatment of most types of driving situations, time of day, location, and weather conditions with which an automobile driver is confronted. The most notable exception was the lack of treating an expressway driving situation.

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[11] Sister Thomas More Emery, O. P., "A Critical Review of Selected 'You Are the Jury' Tapes" (Unpublished independent study, Michigan State University, Highway Traffic Safety Center, August, 1966).

That portion of each of the four selected programs which described the accidents was dubbed onto one tape. A test booklet (see Appendix C) was prepared. It described briefly the procedure to be followed while taking the test, provided a drawing of each accident location, and listed the names of the people or objects involved in the accident. It then asked two questions about each accident:

Question A: How could the accident have been prevented?

Question B: Who do you feel is primarily responsible for the cause of the accident?

Each student was given the following instructions, "Answer in essay form for each of the people involved in the accident. Make your answers as thorough as possible in the time allotted. If additional space is needed, continue on the back of the page." Students were given seven minutes to respond to each tape. Transparencies were prepared and projected on a screen while the description of the accident was being played and while the students were answering the questions.

To insure uniformity, a tape of the directions for taking the test was made (see cover sheet of test booklet - Appendix C). A set of instructions for the person administering the test was also provided (see Appendix C). The same person gave the test to all of the students.

Content validity of the test instrument was established by submitting a typed verbatim copy of the taped narrative description of each accident, plus the criteria to be used in evaluating the student responses (see Appendix C) to each member of the Project Advisory Committee. Their responses attested the validity of the instrument. The evaluation criteria for each program were based on an analysis of the accident by the Highway Traffic Safety Center Staff[12] and additional factual material included in the narrative portion of each tape. Two points were assigned to those factors which were considered primary causes of the accident. One point was assigned to those factors which contributed to the cause of the accident but were not considered primary.

The unreliability, lack of consistency, of the scoring of the pupil's response is one of the major limitations encountered when pupil achievement is measured by means of an essay test. However, it is possible to vastly improve scores or reader reliability if certain conditions are observed. First, the responses being scored must have been elicited by carefully framed test items which present the examinee with a well-defined task. Secondly, individuals preparing scoring systems using the analytical or rating method must master the method thoroughly and apply it carefully. Third, ample time must be allowed for the scoring.[13] The Encyclopedia of Educational Research, Third

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[12] Professional Staff of the Highway Traffic Safety Center, Michigan State University, East Lansing, Michigan.

[13] Ahmann and Glock, op. cit., p. 178.

Edition, has also given some factors which affect reader reliability. Some of these are as follows:

> The training of the reader - highly trained readers are more reliable than untrained ones.
>
> The specificity of the grading or marking criteria employed by the readers - the more precise and detailed the marking criteria, the higher the reliability.
>
> The extent to which the question is structured for the examinee - the greater the structuring, the higher the reliability.
>
> The heterogeneity of the population of candidates from which the essays to be marked are drawn - marks of paper drawn from homogeneous population are much less reliable than the marks of those drawn from heterogeneous population.
>
> The familiarity of the marker [reader] with the student - markers [readers] well acquainted with the work of the student are more reliable than those who do not know the student.[14]

The conditions listed above for improving reader reliability were all met to the greatest extent possible in scoring the responses to the Traffic Analysis Test. Reader reliability has been defined as "the extent to which individuals can agree on the score which should be assigned a particular essay question."[15] The two questions on each accident situation were structured to give the examinee a well-defined task, i.e., a statement as to how the accident described might have been prevented. The group of students involved in the study was heterogeneous since it involved most sophomore students at Renton High School. Three scorers were used in evaluating the student responses. The scorers were instructors in the program and were familiar with both the program and students. Instructional treatment groups were not identified with students prior to or during the scoring of the papers. The three scorers went through a training session with the Project Director and the Director of Research, Office of the Washington State Superintendent of Public Instruction. Detailed evaluation criteria (see Appendix C) and score point values assigned were distributed to the scorers and were reviewed critically. Each was then given three test booklets, randomly selected, and was asked to evaluate them. Scores were not placed on the test booklet. After each, individually, had scored the three test booklets, the results were compared and differences in scoring analyzed. Following this analysis, three additional test booklets were selected randomly and treated in the same manner as described above. This process continued until twelve tests had been scored. The twelve tests were then returned to their original places. The scorers approached a more equal assignment of points as the scoring progressed. Forty-eight tests, eight from each period, were then selected randomly for determining a reliability coefficient of the scorers. Each reader scored the forty-eight tests independently. Reliability coefficients derived were .790, .864, .896, which are relatively high for this type of scoring. The remaining tests were divided into the twelve instructional treatment groups by period. Each reader scored one-third of each instructional treatment group. Adequate time was provided for the scoring of all tests.

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[14] Chester W. Harris (ed.), Encyclopedia of Educational Research (Third Edition; New York: The Macmillan Company, 1960), p. 1504.

[15] *Ibid.*

Sub-Problem Nine - Collecting and applying statistical treatment of the data.

Scores from the pre and post National Test in Driver Education (special form),[16] McGlade Road Test,[17] and Traffic Analysis Test[18] were collected, matched, and placed in individual folders. A student information card containing the student's age, sex, instructional treatment group, classroom group, laboratory group, driver license number, and other pertinent information was also placed in the folder. These data were then key punched on IBM cards and transferred to a tape file for an IBM System 360 Computer.[19] A program was then set up to produce the necessary information to test our hypotheses.

The following statistical treatments were applied to the data:

1. A three-way factorial (4 X 3 X 2) unweighted means analysis of variance was applied to each of the seven criterion variables to test the basic hypotheses concerning the relative effectiveness of the four laboratory programs, the three classroom programs, female and male students, and their various interactions. Unequal cell frequencies indicated the use of an unweighted means analysis as outlined by Winer.[20]

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[16] National Test in Driver Education (Special Form; New York: New York University, Center for Safety Education, 1967).

[17] Francis S. McGlade, A New Road Test for Use in Driver Licensing, Education and Employment (New York: New York University, Center for Safety Education, 1961).

[18] "You Are the Jury" Traffic Analysis Test - developed as a part of this investigation as described in pp. 78-82.

[19] The Washington State Office of the Superintendent of Public Instruction has installed an International Business Machines (IBM) System 360, Model 30 Computer.

[20] B. J. Winer, Statistical Principles in Experimental Design (New York: McGraw Hill Book Company, 1962), pp. 222-224, 374-378.

2. Scheffé's Test for Multiple Comparisons was applied in those instances where analysis of variance resulted in an F-value significant at a level equal to or less than .05.[21]

3. The McGlade Road Test[22] provided, in part, for the rejection of the examinee and termination of the test. As a result, a certain portion of the total sample of pupils returned incomplete and, therefore, unusable deduction scores for the Road Test - Parts I, II, and Total. The analysis of variance described above was applied to deduction scores of only those subjects who completed the Road Test.

4. Chi square was used to determine whether the frequency of rejection on the Road Test differed significantly among the four laboratory programs, among the three classroom programs, and between the sexes.[23]

5. Chi square was used to test the hypotheses regarding the relative number of rejects and the proportion of pass versus fail which were made by students on the McGlade Road Test.[24]

6. The Pearson Product-Moment Coefficient of Correlation[25] was computed to determine whether a relationship existed between the study population's scores on the Pre-Driving Knowledge Test, Post-Driving Knowledge Test, Traffic Analysis Test, and Road Performance Test. Significance of coefficient of correlation was determined by the procedure explained in McNemar.[26]

7. A t-test was employed to determine if a significant gain in mean scores from Pre-Test to Post-Test for Driving Knowledge existed within any of the three classroom programs, four laboratory programs, female students, or male students.[27]

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[21] Allen L. Edwards, Experimental Design in Psychological Research (Revised Edition; New York: Holt, Rinehart, and Winston, May, 1962), pp. 154-156.

[22] McGlade, loc. cit.

[23] Quinn McNemar, Psychological Statistics (Third Edition; New York: John Wiley & Sons, Inc., 1962), pp. 228-229.

[24] McGlade, loc. cit.

[25] William L. Hays, Statistics for Psychologists (New York: Holt, Rinehart, and Winston, 1963), pp. 496-510.

[26] McNemar, op. cit., p. 137.

[27] Ibid., pp. 101-102.

CHAPTER IV

ANALYSIS OF DATA

The ensuing pages deal with the statistical analysis of the data obtained on each student during the investigation. A three-way factorial (4 X 3 X 2) unweighted means analysis of variance;[1] Scheffé's Test for Multiple Comparisons;[2] Chi-square;[3] the Pearson Product - Moment Coefficient of Correlation;[4] and t-test comprise[5] the statistical instruments applied to the data. To insure optimal treatment, the chapter is divided into the following subdivisions:

Pre-Test for Driving Knowledge
Post-Test for Driving Knowledge
Post-Test for Driving Performance - Total
Post-Test for Driving Performance - Part I
Post-Test for Driving Performance - Part II
Post-Test for Traffic Analysis
Linear Correlations

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[1] B. J. Winer, Statistical Principles in Experimental Design (New York: McGraw Hill Book Company, 1962), pp. 222-224, 374-378.

[2] Allen L. Edwards, Experimental Design in Psychological Research (Revised Edition; New York: Holt, Rinehart, and Winston, May, 1962), pp. 154-156.

[3] Quinn McNemar, Psychological Statistics (Third Edition, New York: John Wiley & Sons, Inc., 1962), pp. 228-229.

[4] William L. Hays, Statistics for Psychologists (New York: Holt, Rinehart, and Winston, 1963), pp. 496-510.

[5] McNemar, op. cit., p. 101.

Pre-Test for Driving Knowledge

The National Test in Driver Education (Special Form)[6] was given to all students in the study prior to instruction. The means and standard deviations of scores on the Pre-Test for Driving Knowledge are recorded below for the four laboratory programs (Table I), the three classroom programs (Table II), and for each sex (Table III).

TABLE I

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE PRE-TEST FOR DRIVING KNOWLEDGE AMONG THE FOUR LABORATORY PROGRAMS

Laboratory Program	N	Mean	Unweighted Mean*	Standard Deviation
Four-Phase	210	49.94	49.836	4.850
Standard	211	49.75	49.733	5.088
Simulator	196	49.86	49.862	4.377
Range	184	50.20	50.143	4.643

*Since an unweighted means analysis of variance was used, both means are given in these tables. No significant differences among these means occurred at the .05 level.

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[6] National Test in Driver Education (Special Form; New York: New York University, Center For Safety Education, 1967).

TABLE II

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE PRE-TEST FOR DRIVING KNOWLEDGE AMONG THE THREE CLASSROOM PROGRAMS

Classroom Program	N	Mean	Unweighted Mean*	Standard Deviation
30 hour Classroom	268	49.99	49.958	4.671
30 hour Classroom plus 15 hour Drivocator	259	50.03	49.996	4.384
45 hour Classroom	274	49.78	49.728	5.157

*No significant differences among these means occurred at the .05 level.

TABLE III

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE PRE-TEST FOR DRIVING KNOWLEDGE BETWEEN FEMALE AND MALE STUDENTS

Sex	N	Mean	Unweighted Mean*	Standard Deviation
Female	399	48.94	48.903	4.539
Male	402	50.92	50.885	4.756

*No significant differences among these means occurred at the .05 level.

A three-way factorial (4 X 3 X 2) unweighted means analysis of variance was used to test the null hypotheses that no significant differences would probably exist among the mean scores attained by students assigned to one of four laboratory programs, one of three classroom programs, or between female and male students. Since the computed values of F (Table IV) were less than the critical value of F, the null hypotheses of no difference among the four laboratory programs; among the three classroom programs; or between female and male students was accepted at the .05 level of significance.

TABLE IV

ANALYSIS OF VARIANCE, PRE-TEST FOR DRIVING KNOWLEDGE

	Sum of Squares	Degree of Freedom	Mean Square	Computed Value of F	Critical Value of F(.05)	Significance
Laboratory	.5539	3	.1846	<1		no
Sex	23.5819	1	23.5819	3.5945	3.86	no
Classroom	.3377	2	.1689	<1		no
Classroom X Laboratory	3.6447	6	.6075	<1		no
Classroom X Sex	2.9702	2	1.4851	<1		no
Laboratory X Sex	.2266	3	.0755	<1		no
3-Way Interaction	7.3380	6	1.2230	<1		no
Within Cells		777	6.5606			
		800				

Post-Test for Driving Knowledge

The National Test in Driver Education (Special Form)[7] was again administered to all students at the completion of the course. The means and standard deviations of scores on this Post-Test for Driving Knowledge are recorded below for the four laboratory programs (Table V), the three classroom programs (Table VI), and for each sex (Table VII).

TABLE V

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE POST-TEST FOR DRIVING KNOWLEDGE AMONG THE FOUR LABORATORY PROGRAMS

Laboratory Program	N	Mean	Unweighted Mean*	Standard Deviation
Four-Phase	210	53.91	53.757	5.128
Standard	211	53.70	53.682	5.369
Simulator	196	54.28	54.312	4.993
Range	184	54.52	54.513	4.151

*No significant differences among these means occurred at the .05 level.

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[7] Ibid.

TABLE VI

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE POST-TEST FOR DRIVING KNOWLEDGE AMONG THE THREE CLASSROOM PROGRAMS

Classroom Program	N	Mean	Unweighted Mean*	Standard Deviation
30 hour Classroom	268	54.03	53.995	4.479
30 hour Classroom plus 15 hour Drivocator	259	54.69	54.736	4.821
45 hour Classroom	274	53.57	53.466	5.455

*Significant differences among these means occurred at the .01 level. See Tables VIII and IX.

TABLE VII

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE POST-TEST FOR DRIVING KNOWLEDGE BETWEEN FEMALE AND MALE STUDENTS

Sex	N	Mean	Unweighted Mean*	Standard Deviation
Female	399	53.05	53.038	5.271
Male	402	55.11	55.094	4.392

*Significant differences among these means occurred at the .001 level. See Table VIII.

A three-way factorial (4 X 3 X 2) unweighted means analysis of variance was used to test the null hypotheses that no significant differences would probably exist among the mean scores attained by students assigned to one of four laboratory programs, one of three classroom programs, or between female and male students. The computed value of F (Table VIII) for the laboratory program was less than the critical value of F. Therefore, the null hypothesis of no difference among the four laboratory programs was accepted at the .05 level of significance. between female and male students. The computed value of F (Table VIII) for the laboratory program was less than the critical value of F. Therefore, the null hypothesis of no difference among the four laboratory programs was accepted at the .05 level of significance.

The computed value of F (Table VIII) for the difference among mean score of students assigned to one of three classroom groups is greater than the critical value (F at the .01 level = 4.64) of F (Table VIII). Therefore, the null hypothesis of no difference is rejected at the .01 level of significance.

The computed value of F (Table VIII) for the difference between mean score attained by female and male students is greater than the critical value (F at the .001 level = 10.83) of F (Table VIII). Therefore, the null hypothesis of no difference was rejected at the .001 level of significance, with the male student having a higher mean score than the female student.

There were no significant interactions among the three factors in the analysis, although the three-way interaction did approach significance at the .05 level.

TABLE VIII

ANALYSIS OF VARIANCE, POST-TEST FOR DRIVING KNOWLEDGE

	Sum of Squares	Degree of Freedom	Mean Square	Computed Value of F	Critical Value of F(.05)	Significance
Laboratory	3.0232	3	1.0077	1.4390	2.62	no
Sex	25.3792	1	25.3792	36.2405	3.86	.001
Classroom	6.5118	2	3.2559	4.6493	3.02	.01
Classroom X Laboratory	3.3144	6	.5524	<1		no
Classroom X Sex	2.7902	2	1.3951	1.9921	3.02	no
Laboratory X Sex	2.4091	3	.8030	1.1467	2.62	no
3-Way Interaction	8.8079	6	1.4680	2.0962	2.11	no
Within Cells		777	.7003			
		800				

Scheffé's Test for Multiple Comparisons[8] was applied to isolate the classroom programs having significant differences. Because the computed and critical values of F were so close, it was impossible to isolate the differences at the .01 level. However, significance between classroom groups at the .05 level was found between the thirty hour classroom plus fifteen hour drivocator program and the forty-five hour classroom program in favor of the thirty hour classroom plus fifteen hour drivocator program (Table IX). Edwards states that Scheffé's Test is more conservative and larger differences will be required for significance.[9]

TABLE IX

SCHEFFÉ'S TEST FOR MULTIPLE COMPARISONS,
POST-TEST SCORES FOR DRIVING KNOWLEDGE - CLASSROOM PROGRAMS

Classroom Program	Unweighted Mean	Comparisons C_1	C_2
30 hour Classroom	53.995	0	-1
30 hour Classroom plus 15 hour Drivocator	54.736	+1	+1
45 hour Classroom	53.466	-1	0
d_i =		1.270	.741
Σa^2 =		2	2
S_{d_i} =		.4184	.4184
t =		3.035	1.771

Mean Square Error = .7003 N = 8
Critical Value of t (at the .05 level) = 2.458

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[8] Edwards, loc. cit.

[9] Ibid., p. 154.

A further examination of the data revealed that five extreme scores (all female students) on the Post-Test for Driving Knowledge did not fall within the normal range of the other scores. A supplemental analysis, after eliminating the five extreme scores, produced no change in the level of significant differences among the classroom programs or between female and male students. However, the elimination of the extreme scores did result in significance at the .05 level of confidence in the two-way interaction between classroom and sex and a three-way interaction between classroom, laboratory and sex (see Appendix G for the supplemental analysis).

Gain from Pre-Test to Post-Test for Driving Knowledge

The National Test in Driver Education (Special Form)[10] was given to all students in the study prior to instruction and again at the completion of the instructional period. Mean and standard deviations of gain scores were computed for the total sample, laboratory programs, classroom programs, female students, and male students (Table X). A t-test[11] was employed to determine if a significant gain in mean scores from the Pre-Test to the Post-Test for Driving Knowledge occurred.

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[10] National Test in Driver Education, loc. cit.

[11] McNemar, op. cit., pp. 101-102.

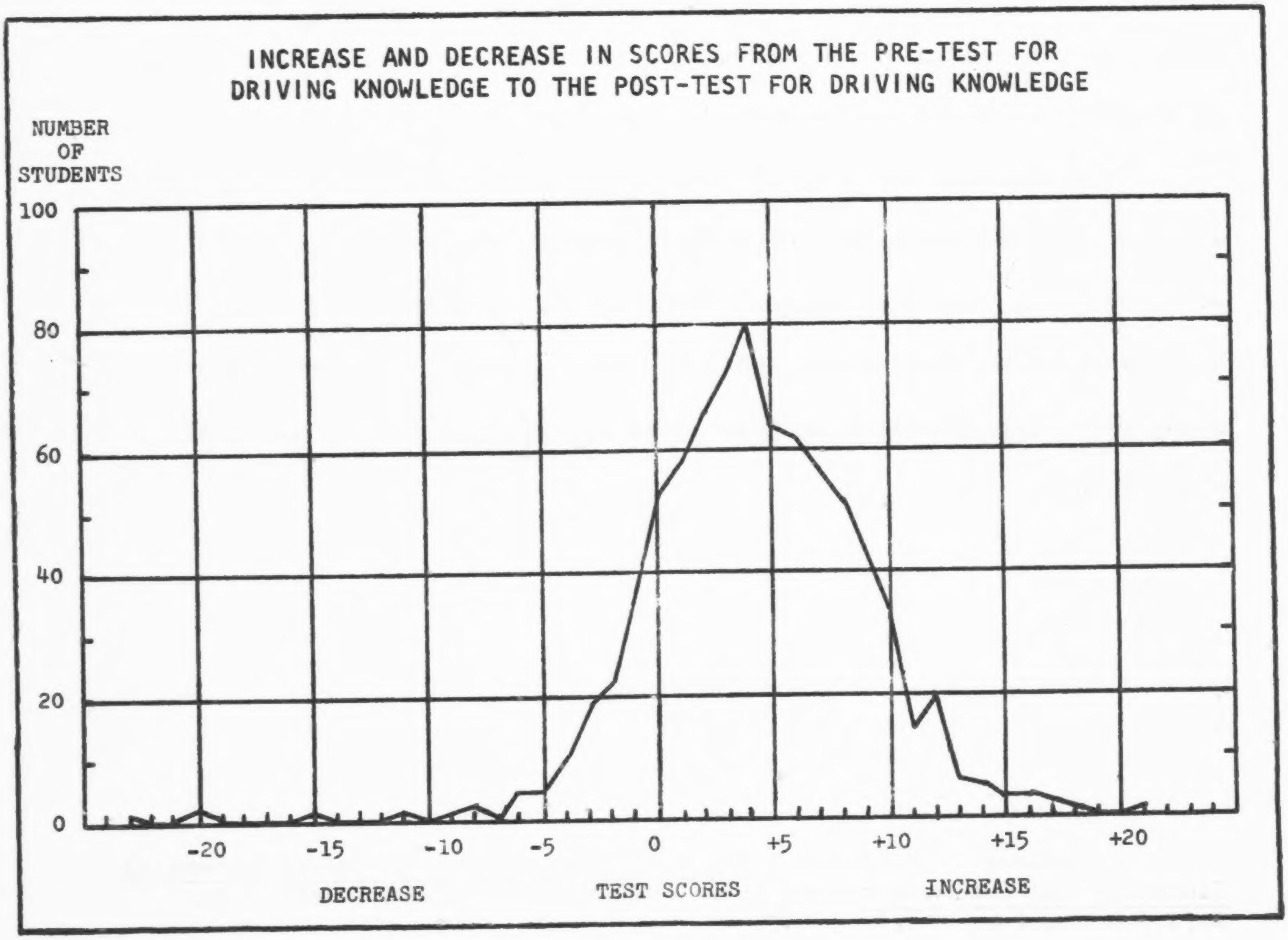
TABLE X

SUMMARY, T-TEST FOR SIGNIFICANCE OF GAIN BETWEEN MEANS OF PRE-TEST AND POST-TEST SCORES FOR DRIVING KNOWLEDGE

	N	Mean of Gain Scores	Standard Deviation of Gain Scores	Degrees of Freedom	Computed Value of t	Critical Value of t (.05)	Significance
Total Sample	801	4.15	4.668	800	25.1667	1.658	.001
Laboratory Program							
Four-Phase	210	3.97	4.835	209	11.9004	1.658	.001
Standard	211	3.95	4.782	210	11.9987	1.658	.001
Simulator	196	4.41	4.645	195	13.2951	1.658	.001
Range	184	4.32	4.376	183	13.3911	1.658	.001
Classroom Program							
30 hour Classroom	268	4.04	4.136	267	15.9936	1.658	.001
30 hour Classroom plus 15 hour Drivocator	259	4.65	4.776	258	15.6723	1.658	.001
45 hour Classroom	274	3.79	5.020	273	12.5000	1.658	.001
Sex							
Female	399	4.11	5.0201	398	16.3549	1.658	.001
Male	402	4.19	4.2966	401	19.5798	1.658	.001

There was a significant gain in mean scores at the .001 level of confidence for the total sample, for each laboratory program, for each classroom program, and for both female and male students. Further evaluation revealed that 80.3% of the students made some gain from the Pre-Test to the Post-Test for Driving Knowledge, 6.5% of the students did not have a change in their scores from the Pre-Test to the Post-Test, and 13.2% of the students had a decrease in scores from the Pre-Test to the Post-Test for Driving Knowledge. Figure 2 provides additional information on the amount of increase or decrease in scores from the Pre-Test to the Post-Test.

FIGURE 2



INCREASE AND DECREASE IN SCORES FROM THE PRE-TEST FOR DRIVING KNOWLEDGE TO THE POST-TEST FOR DRIVING KNOWLEDGE

Post-Test for Driving Performance - Total

The McGlade Road Test was given to all students at the completion of the course. This instrument provides for the immediate rejection of students at any time during the road test if they, (1) are involved in an accident, (2) make a dangerous action, (3) clearly violate any traffic law, or (4) show a lack of cooperation or refuse to perform as instructed.[12] As a result, a number of students were rejected during the test. Their scores are not usable and have not been included in this statistical treatment.

Chi-square was used to test the hypotheses that there would probably be no significant differences among the four laboratory programs, the three classroom programs, or between the sexes in the number of students rejected on the McGlade Road Test.

The computed value of χ^2 for the laboratory programs (Table XI) and the computed value of χ^2 for the classroom programs (Table XII) were both less than the critical value of χ^2. Therefore, the null hypotheses of no differences among the four laboratory programs and among the three classroom programs were accepted at the .05 level of significance.

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[12] Francis S. McGlade, A New Road Test for Use in Driver Licensing, Education and Employment (New York: New York University, Center for Safety Education, 1961), p. 22.

TABLE XI

CHI-SQUARE TEST FOR THE REJECTION OF STUDENTS ON THE McGLADE ROAD TEST AMONG THE LABORATORY PROGRAMS

Laboratory Program	Reject A	Non-Reject B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
Four-Phase	24	186	210	.8857	164.7429
Standard	27	184	211	.8720	160.4550
Simulator	31	165	196	.8418	138.9031
Range	26	158	184	.8587	135.6739
Total	108	693	801		599.7749
					-599.5618
					.2131

$$\chi^2 = \frac{(801)^2}{108 \text{ X } 693} = \frac{641,601}{74,844} = 8.5725$$

$$\chi^2 = 8.5725 \text{ X } .2131$$

$$\chi^2 = 1.8268$$

The critical value of χ^2 at the .05 level of significance with three degrees of freedom is 7.815.

TABLE XII

CHI-SQUARE TEST FOR THE REJECTION OF STUDENTS ON THE McGLADE ROAD TEST AMONG THE CLASSROOM PROGRAMS

Classroom Program	Reject A	Non-Reject B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
30 hour Classroom	32	236	268	.8806	207.8209
30 hour Classroom plus 15 hour Drivocator	34	225	259	.8687	195.4633
45 hour Classroom	42	232	274	.8467	196.4380
Total	108	693	801		599.7222
					-599.5618
					.1604

$$\chi^2 = \frac{(801)^2}{108 \text{ X } 693} = \frac{641{,}601}{74{,}844} = 8.5725$$

$$\chi^2 = 8.5725 \text{ X } .1604$$

$$\chi^2 = 1.3750$$

The critical value of χ^2 at the .05 level of significance with two degrees of freedom is 5.991.

The computed value of χ^2 (Table XIII) for the differences between the number of female and male students rejected on the McGlade Road Test is greater than the critical value (χ^2 with one degree of freedom at the .01 level = 6.635) of χ^2 (Table XIII). Therefore, the null hypothesis of no difference was rejected at the .01 level of significance with the female student having a higher frequency of rejection than the male student.

TABLE XIII

CHI-SQUARE TEST FOR THE REJECTION OF STUDENTS ON THE McGLADE ROAD TEST BETWEEN THE SEXES

Sex	Reject A	Non-Reject B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
Female	69	330	399	.8271	272.9323
Male	39	363	402	.9030	327.7836
Total	108	693	801		600.7159
					-599.5618
					1.1541

$$\chi^2 = \frac{(801)^2}{108 \text{ X } 693} = \frac{641{,}601}{74{,}844} = 8.5725$$

$$\chi^2 = 8.5725 \text{ X } 1.1541$$

$$\chi^2 = 9.8935$$

The critical value of χ^2 at the .05 level of significance with one degree of freedom is 3.841.

A further analysis of differences on the McGlade Road Test[13] was pursued as a result of finding significance of rejection on the McGlade Road Test between the sexes. Chi-square was used to determine whether significant differences existed among the three classroom programs or among the four laboratory programs when female and male samples were analyzed separately.

The computed values of χ^2 for female and male students in the laboratory programs (Tables XIV, XV) and the computed values of χ^2 for female and male students in the classroom programs (Tables XVI, XVII) who were rejected on the McGlade Road Test were all less than the critical values of χ^2. These results suggest that no significant classroom X sex or laboratory X sex interaction exist.

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[13] Ibid.

TABLE XIV

CHI-SQUARE TEST FOR THE REJECTION OF FEMALE STUDENTS ON THE McGLADE ROAD TEST AMONG THE LABORATORY PROGRAMS

Laboratory Program	Reject A	Non-Reject B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
Four-Phase	16	79	95	.8315	65.6947
Standard	20	85	105	.8095	68.8095
Simulator	16	84	100	.8400	70.5600
Range	17	82	99	.8282	67.9191
Total	69	330	399		272.9833
					-272.9323
					.0510

$$\chi^2 = \frac{(399)^2}{69 \text{ X } 330} = \frac{159{,}201}{22{,}770} = 6.9917$$

$$\chi^2 = 6.9917 \text{ X } .0510$$

$$\chi^2 = 3.566$$

The critical value of χ^2 at the .05 level of significance with three degrees of freedom is 7.815.

TABLE XV

CHI-SQUARE TEST FOR THE REJECTION OF MALE STUDENTS ON THE McGLADE ROAD TEST AMONG THE LABORATORY PROGRAMS

Laboratory Program	Reject A	Non-Reject B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
Four-Phase	8	107	115	.9304	99.5565
Standard	7	99	106	.9340	92.4623
Simulator	15	81	96	.8437	68.3437
Range	9	76	85	.8941	67.9529
Total	39	363	402		328.3154
					-327.7836
					.5318

$$\chi^2 = \frac{(402)^2}{39 \times 363} = \frac{161{,}604}{14{,}157} = 11.4151$$

$$\chi^2 = 11.4151 \times .5318$$

$$\chi^2 = 6.0706$$

The critical value of χ^2 at the .05 level of significance with three degrees of freedom is 7.815.

TABLE XVI

CHI-SQUARE TEST FOR THE REJECTION OF FEMALE STUDENTS ON THE McGLADE ROAD TEST AMONG THE CLASSROOM PROGRAMS

Classroom Program	Reject A	Non-Reject B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
30 hour Classroom	21	108	129	.8372	90.4186
30 hour Classroom plus 15 hour Drivocator	21	116	137	.8467	98.2190
45 Hour Classroom	27	106	133	.7970	84.4812
Total	69	330	399		273.1188
					-272.9323
					.1865

$$\chi^2 = \frac{(399)^2}{69 \text{ X } 330} = \frac{159,201}{22,770} = 6.9917$$

$$\chi^2 = 6.9917 \text{ X } .1865$$

$$\chi^2 = 1.3040$$

The critical value of χ^2 at the .05 level of significance with two degrees of freedom is 5.991.

TABLE XVII

CHI-SQUARE TEST FOR THE REJECTION OF MALE STUDENTS ON THE McGLADE ROAD TEST AMONG THE CLASSROOM PROGRAMS

Classroom Program	Reject A	Non-Reject B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
30 hour Classroom	11	128	139	.9209	117.8705
30 hour Classroom plus 15 hour Drivocator	13	109	122	.8934	97.3852
45 hour Classroom	15	126	141	.8936	112.5957
Total	39	363	402		327.8514
					-327.7836
					.0678

$$\chi^2 = \frac{(402)^2}{39 \text{ X } 363} = \frac{161,604}{14,157} = 11.4151$$

$$\chi^2 = 11.4151 \text{ X } .0678$$

$$\chi^2 = .7739$$

The critical value of χ^2 at the .05 level of significance with two degrees of freedom is 5.991.

3

On the basis of past experimentation, a maximum allowable deduction of 54 points appears reasonable as a minimum passing score.[14] For the purpose of this report, then, those students who had deductions of more than 54 points and/or were rejected by the examiner, failed the Road Test. Chi-square was also used to test the hypotheses that there would probably be no significant differences among the four laboratory programs, the three classroom programs, or between the sexes in the number of students who pass or fail the McGlade Road Test.

The computed value of χ^2 for the laboratory programs (Table XVIII) and the computed value of χ^2 for the classroom programs (Table XIX) were both less than the critical values of χ^2. Therefore, the null hypotheses of no differences among the four laboratory programs and among the three classroom programs were accepted at the .05 level of significance.

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[14] Ibid., p. 23.

TABLE XVIII

CHI-SQUARE TEST FOR THE FAILURE OF STUDENTS ON THE McGLADE ROAD TEST AMONG THE LABORATORY PROGRAMS

Laboratory Program	Fail A	Pass B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
Four-Phase	56	154	210	.7333	112.9333
Standard	45	166	211	.7867	130.5972
Simulator	56	140	196	.7143	100.0000
Range	42	142	184	.7717	109.5870
Total	199	602	801		453.1175
					-452.4395
					.6780

$$\chi^2 = \frac{(801)^2}{199 \text{ X } 602} = \frac{641{,}601}{119{,}798} = 5.3556$$

$$\chi^2 = 5.3556 \text{ X } .6780$$

$$\chi^2 = 3.6311$$

The critical value of χ^2 at the .05 level of significance with three degrees of freedom is 7.815.

TABLE XIX

CHI-SQUARE TEST FOR THE FAILURE OF STUDENTS ON THE McGLADE ROAD TEST AMONG THE CLASSROOM PROGRAMS

Classroom Program	Fail A	Pass B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
30 hour Classroom	64	204	268	.7612	155.2836
30 hour Classroom plus 15 hour Drivocator	70	189	259	.7297	137.9189
45 hour Classroom	65	209	274	.7628	159.4197
Total	199	602	801		452.6222
					-452.4395
					.1827

$$\chi^2 = \frac{(801)^2}{199 \times 602} = \frac{641{,}601}{119{,}798} = 5.7389$$

$$\chi^2 = 5.7389 \times .1827$$

$$\chi^2 = 1.0485$$

The critical value of χ^2 at the .05 level of significance with two degrees of freedom is 5.991.

The computed value of χ^2 (Table XX) for the differences between the number of female and male students who failed the McGlade Road Test is greater than the critical value (χ^2 with one degree of freedom at the .01 level = 6.635) of χ^2 (Table XX). Therefore, the null hypothesis of no difference was rejected at the .01 level of significance with the female student having a higher frequency of failure than the male student.

TABLE XX

CHI-SQUARE TEST FOR THE FAILURE OF STUDENTS
ON THE McGLADE ROAD TEST BETWEEN THE SEXES

Sex	Fail A	Pass B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
Female	131	268	399	.6717	180.0100
Male	68	334	402	.8308	277.5025
Total	199	602	801		457.5125
					452.4395
					5.0730

$$\chi^2 = \frac{(801)^2}{199 \text{ X } 602} = \frac{641{,}601}{119{,}798} = 5.3556$$

$$\chi^2 = 5.3556 \text{ X } 5.0730$$

$$\chi^2 = 27.1690$$

The critical value of χ^2 at the .05 level of significance with one degree of freedom is 3.841.

A further analysis of differences on the McGlade Road Test[15] was pursued as a result of finding significance of failure between the sexes in its application. Chi-square was used to determine whether significant differences existed among the three classroom programs or among the four laboratory programs when female and male samples were analyzed separately.

The computed values of χ^2 for female and male students in the laboratory programs (Tables XXI, XXII) and the computed values of χ^2 for female and male students in the classroom programs (Tables XXIII, XXIV) who failed the McGlade Road Test were all less than the critical values of χ^2. These results suggest that no significant classroom X sex or laboratory X sex interaction exist.

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[15] Ibid.

TABLE XXI

CHI-SQUARE TEST FOR THE FAILURE OF FEMALE STUDENTS ON THE McGLADE ROAD TEST AMONG THE LABORATORY PROGRAMS

Laboratory Program	Fail A	Pass B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
Four-Phase	28	67	95	.7053	47.2526
Standard	29	76	105	.7238	55.0095
Simulator	41	59	100	.5900	34.8100
Range	33	66	99	.6667	44.0000
Total	131	268	399		181.0721
					-180.0100
					1.0621

$$\chi^2 = \frac{(399)^2}{131 \text{ X } 268} = \frac{159{,}201}{35{,}108} = 4.5346$$

$$\chi^2 = 4.5346 \text{ X } 1.0621$$

$$\chi^2 = 4.8162$$

The critical value of χ^2 at the .05 level of significance with three degrees of freedom is 7.815.

TABLE XXII

CHI-SQUARE TEST FOR THE FAILURE OF MALE STUDENTS ON THE McGLADE ROAD TEST AMONG THE LABORATORY PROGRAMS

Laboratory Program	Fail A	Pass B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
Four-Phase	28	87	115	.7565	65.8174
Standard	16	90	106	.8491	76.4151
Simulator	15	81	96	.8438	68.3438
Range	9	76	85	.8941	67.9529
Total	68	334	402		278.5292
					-277.5025
					1.0267

$$\chi^2 = \frac{(402)^2}{68 \text{ X } 334} = \frac{161,604}{22,712} = 7.1154$$

$$\chi^2 = 7.1154 \text{ X } 1.0267$$

$$\chi^2 = 7.3054$$

The critical value of χ^2 at the .05 level of significance with three degrees of freedom is 7.815.

TABLE XXIII

CHI-SQUARE TEST FOR THE FAILURE OF FEMALE STUDENTS ON THE McGLADE ROAD TEST AMONG THE CLASSROOM PROGRAMS

Classroom Program	Fail A	Pass B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
30 hour Classroom	39	90	129	.6977	62.7907
30 hour Classroom plus 15 hour Drivocator	47	90	137	.6569	59.1241
45 hour Classroom	45	88	133	.6617	58.2256
Total	131	268	399		180.1404
					-180.0100
					.1304

$$\chi^2 = \frac{(399)^2}{131 \text{ X } 268} = \frac{159,201}{35,108} = 4.5346$$

$$\chi^2 = 4.5346 \text{ X } .1304$$

$$\chi^2 = .5913$$

The critical value of χ^2 at the .05 level of significance with two degrees of freedom is 5.991.

TABLE XXIV

CHI-SQUARE TEST FOR THE FAILURE OF MALE STUDENTS ON THE McGLADE ROAD TEST AMONG THE CLASSROOM PROGRAMS

Classroom Program	Fail A	Pass B	A+B	$\frac{B}{A+B}$	$\frac{B^2}{A+B}$
30 hour Classroom	25	114	139	.8201	93.4964
30 hour Classroom plus 15 hour Drivocator	23	99	122	.8115	80.3361
45 hour Classroom	20	121	141	.8582	103.8369
Total	68	334	402		277.6694
					-277.5025
					.1669

$$\chi^2 = \frac{(402)^2}{68 \text{ X } 334} = \frac{161,604}{22,712} = 7.1154$$

$$\chi^2 = 7.1154 \text{ X } .1669$$

$$\chi^2 = 1.1876$$

The critical value of χ^2 at the .05 level of significance with two degrees of freedom is 5.991.

The means and standard deviations of deduction scores on the Post-Test for Driving Performance are recorded below for the four laboratory programs (Table XXV), the three classroom programs (Table XXVI), and for each sex (Table XXVII).

TABLE XXV

MEANS AND STANDARD DEVIATIONS OF DEDUCTION SCORES ON THE POST-TEST FOR DRIVING PERFORMANCE AMONG THE FOUR LABORATORY PROGRAMS

Laboratory Program	N	Mean	Unweighted Mean*	Standard Deviation
Four-Phase	186	42.29	42.846	21.250
Standard	184	40.01	40.144	22.963
Simulator	165	46.89	46.831	24.866
Range	158	41.53	41.303	22.395

*Significant differences among these means occurred at the .05 level. See Tables XXVIII and XXIX.

TABLE XXVI

MEANS AND STANDARD DEVIATIONS OF DEDUCTION SCORES ON THE POST-TEST FOR DRIVING PERFORMANCE AMONG THE THREE CLASSROOM PROGRAMS

Classroom Program	N	Mean	Unweighted Mean*	Standard Deviation
30 hour Classroom	236	40.51	40.944	21.968
30 hour Classroom plus 15 hour Drivocator	225	42.55	42.566	23.703
45 hour Classroom	232	44.79	44.833	23.099

*No significant differences among these means occurred at the .05 level.

TABLE XXVII

MEANS AND STANDARD DEVIATIONS OF DEDUCTION SCORES ON THE POST-TEST FOR DRIVING PERFORMANCE BETWEEN FEMALE AND MALE STUDENTS

Sex	N	Mean	Unweighted Mean*	Standard Deviation
Female	330	46.95	46.937	24.485
Male	363	38.65	38.625	20.726

*Significant differences among these means occurred at the .001 level. See Table XXVIII.

A three-way factorial (4 X 3 X 2) unweighted means analysis of variance was used to test the null hypotheses that no significant differences would probably exist among the mean scores attained by students assigned to one of four laboratory programs, one of three classroom programs, or between female and male students. The computed value of F (Table XXVIII) for the classroom program was less than the critical value of F. Therefore, the null hypothesis of no difference among the three classroom programs was accepted at the .05 level of significance.

The computed value of F (Table XXVIII) for the difference among mean scores of students assigned to one of four laboratory programs is greater than the critical value of F (Table XXVIII). Therefore, the null hypothesis of no difference is rejected at the .05 level of significance.

The computed value of F (Table XXVIII) for the difference between mean score attained by female and male students is greater than the critical value (F at the .001 level = 10.83) of F (Table XXVIII). Therefore, the null hypothesis of no difference is rejected at the .001

level of significance, with the female student having a higher mean deduction score than the male student.

There were no significant interactions among the three factors in the analysis, although the three-way interaction did approach significance at the .05 level.

TABLE XXVIII

ANALYSIS OF VARIANCE, POST-TEST FOR DRIVING PERFORMANCE

	Sum of Squares	Degree of Freedom	Mean Square	Computed Value of F	Critical Value of F(.05)	Significance
Laboratory	153.3024	3	51.1008	2.8960	2.62	.05
Sex	414.5776	1	414.5776	23.4951	3.86	.001
Classroom	61.0369	2	30.5185	1.7296	3.02	no
Classroom X Laboratory	131.3007	6	21.8835	1.2402	2.12	no
Classroom X Sex	2.5330	2	1.2665	<1		no
Laboratory X Sex	60.3984	3	20.1328	1.1410	2.62	no
3-Way Interaction	221.2047	6	36.8675	2.0894	2.12	appr. .05
Within Cells		669	17.6453			
		692				

Scheffé's Test for Multiple Comparisons was applied to isolate the laboratory programs having significant differences. No significant difference was found at the .05 level between the widest range of mean scores for the different laboratory programs. "Scheffé suggests that with his test we might consider taking $\alpha = .10$ rather than $\alpha = .05$."[16] On this basis, significance was found at the .10 level between the standard program and the simulator program in favor of the standard program (Table XXIX).

If significance can not be found between the mean scores of the groups, Edwards suggests that the difference might lie in a comparison of different combinations of the treatments sums.[17] Significance was found at the .05 level between the simulator program and a combination of the standard program and range program in favor of the combination standard program and range program. No other significant differences were found between comparison of different combinations of treatment sums (Table XXIX).

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[16] Edwards, op. cit., p. 154.

[17] Ibid., pp. 154-155.

TABLE XXIX

SCHEFFE'S TEST FOR MULTIPLE COMPARISONS, POST-TEST DEDUCTION SCORES FOR DRIVING PERFORMANCE - LABORATORY PROGRAMS

Laboratory Program	Unweighted Mean	C_1	C_2	C_3	C_4	C_5
Four Phase	42.846	0	0	+1	0	+1
Standard	40.144	-1	0	-1	-1	-2
Simulator	46.831	+1	+1	+1	+2	+1
Range	41.303	0	-1	-1	-1	0
d_i =		6.687	5.528	8.230	12.215	9.389
Σa^2 =		2	2	4	6	6
S_{d_i} =		2.425	2.425	3.430	4.201	4.201
t =		2.758	2.280	2.399	2.908	2.235

Mean Square Error = 17.6453 N = 6
Critical Value of t (at the .05 level) = 2.803
Critical Value of t (at the .10 level) = 2.516

Post-Test for Driving Performance - Part I

For the purpose of this study, a further examination of the Post-Test for Driving Performance[18] was made by dividing the test items into two parts. Part I included those items which were basically manipulative skills. The means and standard deviations of deduction scores on the Post-Test for Driving Performance - Part I, are recorded below for the four laboratory programs (Table XXX), the three classroom programs (Table XXXI), and for each sex (Table XXXII).

TABLE XXX

MEANS AND STANDARD DEVIATIONS OF DEDUCTION SCORES ON THE POST-TEST FOR DRIVING PERFORMANCE - PART I, AMONG THE FOUR LABORATORY PROGRAMS

Laboratory Program	N	Mean	Unweighted Mean*	Standard Deviation
Four-Phase	186	24.63	25.084	14.408
Standard	184	21.89	21.961	13.606
Simulator	165	26.73	26.725	16.497
Range	158	23.82	23.844	14.434

*Significant differences among these means occurred at the .05 level. See Tables XXXIII and XXXIV.

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[18] McGlade, loc. cit.

TABLE XXXI

MEANS AND STANDARD DEVIATIONS OF DEDUCTION SCORES ON THE POST-TEST FOR DRIVING PERFORMANCE - PART I, AMONG THE THREE CLASSROOM PROGRAMS

Classroom Program	N	Mean	Unweighted Mean*	Standard Deviation
30 hour Classroom	236	22.91	23.252	14.626
30 hour Classroom plus 15 hour Drivocator	225	24.61	24.697	14.999
45 hour Classroom	232	25.17	25.261	14.772

*No significant differences among these means occurred at the .05 level.

TABLE XXXII

MEANS AND STANDARD DEVIATIONS OF DEDUCTION SCORES ON THE POST-TEST FOR DRIVING PERFORMANCE - PART I, BETWEEN FEMALE AND MALE STUDENTS

Sex	N	Mean	Unweighted Mean*	Standard Deviation
Female	330	26.82	26.844	15.543
Male	363	21.85	21.963	13.703

*Significant differences among these means occurred at the .001 level. See Table XXXIII.

A three-way factorial (4 X 3 X 2) unweighted means analysis of variance was used to test the null hypotheses that no significant differences would probably exist among the mean scores attained by students assigned to one of four laboratory programs, one of three classroom programs, or between female and male students. The computed value of F

(Table XXXIII) for the classroom program was less than the critical value of F. Therefore, the null hypothesis of no difference among the three classroom programs was accepted at the .05 level of significance.

The computed value of F (Table XXXIII) for the difference among mean scores of students assigned to one of four laboratory programs is greater than the critical value of F (Table XXXIII). Therefore, the null hypothesis of no difference is rejected at the .05 level of significance.

The computed value of F (Table XXXIII) for the difference between mean scores attained by female and male students is greater than the critical value (F at the .001 level = 10.83) of F (Table XXXIII). Therefore, the null hypothesis of no difference is rejected at the .001 level of significance, with the female student having a higher mean deduction score than the male student.

There were no significant interactions among the three factors in the analysis.

TABLE XXXIII

ANALYSIS OF VARIANCE, POST-TEST FOR DRIVING PERFORMANCE - PART I

	Sum of Squares	Degree of Freedom	Mean Square	Computed Value of F	Critical Value of F(.05)	Significance
Laboratory	72.7850	3	24.2617	3.2769	2.62	.05
Sex	142.9846	1	142.9846	19.3121	3.86	.001
Classroom	17.1815	2	8.5908	1.1603	3.02	no
Classroom X Laboratory	55.8454	6	9.3076	1.2571	2.12	no
Classroom X Sex	20.3985	2	10.1993	1.3776	3.02	no
Laboratory X Sex	8.7607	3	2.9202	<1		no
3-Way Interaction	69.5133	6	11.5856	1.5648	2.12	no
Within Cells		669	7.4039			
		692				

Scheffé's Test for Multiple Comparisons was applied to isolate the laboratory programs having significant differences. Significance at the .05 level of confidence (Table XXXIV) was found between the standard program and simulator program in favor of the standard program. No other significant differences were found among the laboratory programs.

TABLE XXXIV

SCHEFFÉ'S TEST FOR MULTIPLE COMPARISONS, POST-TEST DEDUCTION SCORES FOR DRIVING PERFORMANCE - PART I - LABORATORY PROGRAMS

Laboratory Program	Unweighted Mean	C_1	C_2	C_3
Four-Phase	25.084	0	+1	0
Standard	21.961	-1	-1	0
Simulator	26.725	+1	0	+1
Range	23.844	0	0	-1
d_i =		4.764	3.123	2.881
Σa^2 =		2	2	2
S_{d_i} =		1.571	1.571	1.571
t =		3.032	1.988	1.834

Mean Square Error = 7.4039 N = 6
Critical Value of t (at the .05 level) = 2.803

Post-Test for Driving Performance - Part II

For the purpose of this investigation, a further examination of the Post-Test for Driving Performance[19] was made by dividing the test items into two parts. Part II includes those items which are primarily perceptual skills. The means and standard deviations of deduction scores on the Post-Test for Driving Performance - Part II, are recorded below for the four laboratory programs (Table XXXV), the three classroom programs (Table XXXVI), and for each sex (Table XXXVII).

TABLE XXXV

MEANS AND STANDARD DEVIATIONS OF DEDUCTION SCORES ON THE POST-TEST FOR DRIVING PERFORMANCE - PART II, AMONG THE FOUR LABORATORY PROGRAMS

Laboratory Program	N	Mean	Unweighted Mean*	Standard Deviation
Four-Phase	186	17.66	17.762	11.947
Standard	184	18.12	18.183	13.985
Simulator	165	20.15	20.107	13.299
Range	158	17.71	17.458	13.351

*No significant differences among these means occurred at the .05 level.

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[19] _Ibid._

TABLE XXXVI

MEANS AND STANDARD DEVIATIONS OF DEDUCTION SCORES ON THE POST-TEST FOR DRIVING PERFORMANCE - PART II, AMONG THE THREE CLASSROOM PROGRAMS

Classroom Program	N	Mean	Unweighted Mean*	Standard Deviation
30 hour Classroom	236	17.60	17.692	12.020
30 hour Classroom plus 15 hour Drivocator	225	17.94	17.869	13.684
45 hour Classroom	232	19.61	19.571	13.714

*No significant differences among these means occurred at the .05 level.

TABLE XXXVII

MEANS AND STANDARD DEVIATIONS OF DEDUCTION SCORES ON THE POST-TEST FOR DRIVING PERFORMANCE - PART II, BETWEEN FEMALE AND MALE STUDENTS

Sex	N	Mean	Unweighted Mean*	Standard Deviation
Female	330	20.13	20.093	14.224
Male	363	16.80	16.662	11.916

*Significant differences among these means occurred at the .001 level. See Table XXXVIII.

A three-way factorial (4 X 3 X 2) unweighted means analysis of variance was used to test the null hypotheses that no significant differences would probably exist among the mean scores attained by students assigned to one of four laboratory programs, one of three classroom programs, or between female and male students. The computed value of F (Table XXXVIII) for the laboratory program and the classroom program was less than the critical value of F. Therefore, the null hypotheses of no difference among the four laboratory programs and among the three classroom programs was accepted at the .05 level of significance.

The computed value of F (Table XXXVIII) for the difference between mean scores attained by female and male students is greater than the critical value (F at the .001 level = 10.83) of F (Table XXXVIII). Therefore, the null hypothesis of no difference is rejected at the .001 level of significance, with the female student having a higher mean deduction score than the male student.

There were no significant interactions among the three factors in the analysis.

TABLE XXXVIII

ANALYSIS OF VARIANCE, POST-TEST FOR DRIVING PERFORMANCE - PART II

	Sum of Squares	Degree of Freedom	Mean Square	Computed Value of F	Critical Value of F(.05)	Significance
Laboratory	25.5152	3	8.5051	1.4235	2.62	no
Sex	70.6203	1	70.6203	11.8199	3.86	.001
Classroom	17.2288	2	8.6115	1.4413	3.02	no
Classroom X Laboratory	20.8384	6	3.4731	<1		no
Classroom X Sex	10.7006	2	5.3503	<1		no
Laboratory X Sex	32.1244	3	10.7081	1.7922	2.62	no
3-Way Interaction	61.7840	6	10.2973	1.7235	2.12	no
Within Cells		669	5.9747			
		692				

Post-Test for Traffic Analysis

The Post-Test for Traffic Analysis[20] was given to all students at the completion of the course. The test deals with the analysis of the traffic situation. The means and standard deviations of scores on the Post-Test for Traffic Analysis are recorded below for the four laboratory programs (Table XXXIX), the three classroom programs (Table XL), and for each sex (Table XLI).

TABLE XXXIX

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE POST-TEST FOR TRAFFIC ANALYSIS AMONG THE FOUR LABORATORY PROGRAMS

Laboratory Program	N	Mean	Unweighted Mean*	Standard Deviation
Four-Phase	210	12.21	12.28	3.691
Standard	211	12.34	12.32	3.705
Simulator	196	12.11	12.11	3.498
Range	184	12.74	12.71	3.487

*No significant differences among these means occurred at the .05 level.

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[20] "You Are the Jury" Traffic Analysis Test, developed as a part of this investigation as described in Chapter III, pp. 78-82.

TABLE XL

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE POST-TEST FOR TRAFFIC ANALYSIS AMONG THE THREE CLASSROOM PROGRAMS

Classroom Program	N	Mean	Unweighted Mean*	Standard Deviation
30 hour Classroom	268	12.34	12.379	3.475
30 hour Classroom plus 15 hour Drivocator	259	12.72	12.698	3.463
45 hour Classroom	274	11.99	11.985	3.825

*Significant differences among these means occurred at the .10 level. See Tables XLII and XLIII.

TABLE XLI

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE POST-TEST FOR TRAFFIC ANALYSIS BETWEEN FEMALE AND MALE STUDENTS

Sex	N	Mean	Unweighted Mean*	Standard Deviation
Female	399	12.65	12.64	3.621
Male	402	12.03	12.06	3.563

*Significant differences among these means occurred at the .025 level. See Table XLII.

A three-way factorial (4 X 3 X 2) unweighted means analysis of variance was used to test the null hypotheses that no significant differences would probably exist among the mean scores attained by students assigned to one of four laboratory programs, one of three classroom programs, or between female and male students. The computed value of F (Table XLII) for the difference among mean scores of students assigned to one of four laboratory programs was less than the critical value of F (Table XLII). Therefore, the null hypothesis of no difference among the four laboratory programs was accepted at the .05 level of significance.

The computed value of F (Table XLII) for the difference among mean scores of students assigned to one of three classroom programs was less than the critical value of F (Table XLII). The null hypothesis of no difference among the three classroom programs was accepted at the .05 level of significance. However, the computed value of F is significant at the .10 level of confidence.

The computed value of F (Table XLII) for the difference between mean scores attained by female and male students is greater than the critical value (F at the .025 level = 5.09) of F (Table XLII). Therefore, the null hypothesis of no difference is rejected at the .025 level of significance, with the female student having a higher mean score than the male student.

There were no significant interactions among the three factors in the analysis.

TABLE XLII

ANALYSIS OF VARIANCE, POST-TEST FOR TRAFFIC ANALYSIS

	Sum of Squares	Degree of Freedom	Mean Square	Computed Value of F	Critical Value of F(.05)	Significance
Laboratory	1.1371	3	.3790	<1		no
Sex	2.0242	1	2.0242	5.1611	3.86	.025
Classroom	2.0382	2	1.0191	2.5984	3.02	.10
Classroom X Laboratory	.9154	6	.1526	<1		no
Classroom X Sex	.2310	2	.1155	<1		no
Laboratory X Sex	.1092	3	.0364	<1		no
3-Way Interaction	3.7583	6	.6264	1.5971	2.12	no
Within Cells		777	.3922			
		800				

Scheffé's Test for Multiple Comparisons was applied to isolate the classroom program having significant differences. Significance at the .10 level of confidence (Table XLIII) was found between the thirty hour classroom plus fifteen hour drivocator program and the forty-five hour classroom program in favor of the thirty hour classroom plus fifteen hour drivocator program. No other significant differences were found among the classroom programs.

TABLE XLIII

SCHEFFÉ'S TEST FOR MULTIPLE COMPARISONS, POST-TEST SCORES FOR TRAFFIC ANALYSIS - CLASSROOM PROGRAMS

Classroom Program	Unweighted Mean	C_1	C_2
30 hour Classroom	12.379	0	+1
30 hour Classroom plus 15 hour Drivocator	12.698	+1	0
45 hour Classroom	11.985	-1	-1
d_i =		.713	.394
Σa^2 =		2	2
S_{d_i} =		.313	.313
t =		2.2278	1.258

Mean Square Error = .3922 N = 8
Critical Value of t (at the .05 level) = 2.458
Critical Value of t (at the .10 level) = 2.168

Linear Correlations

The coefficients of intercorrelation among the six criterion measures are shown in Table XLIV. An inspection of the intercorrelation matrix shows that all intercorrelations are significant at the .05 level except the following: Post-Test for Driving Performance - Part II vs. Pre-Test for Driving Knowledge, Post-Test for Driving Performance - Part II vs. Post-Test for Driving Knowledge, and Post-Test for Traffic Analysis vs. Post-Test for Driving Performance - Part I.

The two highest correlation coefficients (.842 and .796) represent an expected relationship between each part score and the total score on the Post-Test for Driving Performance.[21] The relatively low correlation coefficient of .343 between the two parts of the Post-Test for Driving Performance is an indication that those parts do, as defined, measure different components of the driving task.

The low intercorrelations between the Post-Test for Driving Performance (Total, Part I, Part II) and the Pre- and Post-Tests for Driving Knowledge[22] indicate no practical relationship between these two measures. The .304 and .310 correlation coefficients between the Post-Test for Traffic Analysis[23] and the Pre- and Post-Tests for Driving Knowledge indicate a very minor overlap in these two factors.

All negative correlation coefficients in the matrix result from the fact that deduction scores were used for the Post-Test for Driving Performance.

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[21] McGlade, loc. cit.

[22] National Test in Driver Education (Special Form; New York: New York University, Center for Safety Education, 1967).

[23] "You Are the Jury" Traffic Analysis Test, loc. cit.

TABLE XLIV

INTERCORRELATIONS AMONG THE SIX CRITERION MEASURES

	Mean	Number	Pre-Test Driving Knowledge	Post-Test Driving Knowledge	Post-Test Driving Performance - Part I	Post-Test Driving Performance - Part II	Post-Test Driving Performance - Total	Post-Test Traffic Analysis
Pre-Test Driving Knowledge	49.93	801	-					
Post-Test Driving Knowledge	54.08	801	.537	-				
Post-Test Driving Performance - Part I	24.219	693	-.141	-.160	-			
Post-Test Driving Performance - Part II	18.386	693	-.037	-.032	.343	-		
Post-Test Driving Performance - Total	42.605	693	-.113	-.111	.842	.796	-	
Post-Test Traffic Analysis	12.34	801	.304	.310	-.050	-.080	-.075	-

Critical Value of r at the .05 level
N = 693 r = .0744
N = 801 r = .0692

Summary of Findings

This investigation was developed to examine selected laboratory programs, classroom programs, and the differences between female and male students with respect to the six criterion measures. The summation below groups the findings revealed into the above three categories. A section also treats the intercorrelation among the six criterion measures.

The following is a summary of the findings for differences among the four laboratory programs: four-phase, standard, simulator, and range.

1. On the Pre-Test for Driving Knowledge, no significant differences existed among the mean scores attained by students assigned to the four laboratory programs.
2. On the Post-Test for Driving Knowledge, no significant differences existed among the mean scores attained by students assigned to the four laboratory programs.
3. There was a significant gain in the mean scores from the Pre-Test for Driving Knowledge to the Post-Test for Driving Knowledge attained by students assigned to the four laboratory programs.
4. On the Post-Test for Driving Performance, no significant differences existed among the rejection rates of students assigned to the four laboratory programs.
5. On the Post-Test for Driving Performance, no significant differences existed among the failure rates of students assigned to the four laboratory programs.
6. On the Post-Test for Driving Performance, a significant difference at the .05 level of confidence existed among the mean deduction

scores attained by students assigned to the four laboratory programs. Multiple comparisons revealed that students assigned to a simulator program had significantly higher deduction scores than a combination of a standard program and a range program. A significant difference at the .10 level of confidence existed between the mean deduction scores attained by students assigned to a standard program and a simulator program, in favor of the standard program.

7. On the Post-Test for Driving Performance - Part I, a significant difference at the .05 level of confidence existed between the mean scores attained by students assigned to a standard program and a simulator program, in favor of the standard program.
8. On the Post-Test for Driving Performance - Part II, no significant differences existed among the mean scores attained by students assigned to the four laboratory programs.
9. On the Post-Test for Traffic Analysis, no significant differences existed among the mean scores attained by students assigned to the four laboratory programs.

The following is a summary of the findings for differences among the three classroom programs: thirty hour classroom, thirty hour classroom plus fifteen hour drivocator, and forty-five hour classroom.

1. On the Pre-Test for Driving Knowledge, no significant differences existed among the mean scores attained by students assigned to the three classroom programs.
2. On the Post-Test for Driving Knowledge, a significant difference at the .01 level of confidence existed among the mean scores

attained by students assigned to the three classroom programs. Multiple comparisons were unable to isolate any significance at the .01 level, but significance at the .05 level of confidence existed between the mean scores attained by students assigned to a thirty hour classroom plus fifteen hour drivocator program and a forty-five hour classroom program, in favor of the thirty hour classroom plus fifteen hour drivocator program.

3. There was a significant gain in the mean scores from the Pre-Test for Driving Knowledge to the Post-Test for Driving Knowledge attained by students assigned to the three classroom programs.
4. On the Post-Test for Driving Performance, no significant differences existed among the rejection rates of students assigned to the three classroom programs.
5. On the Post-Test for Driving Performance, no significant differences existed among the failure rates of students assigned to the three classroom programs.
6. On the Post-Test for Driving Performance, no significant differences existed among the mean deduction scores attained by students assigned to the three classroom programs.
7. On the Post-Test for Driving Performance - Part I, no significant differences existed among the mean deduction scores attained by students assigned to the three classroom programs.
8. On the Post-Test for Driving Performance - Part II, no significant differences existed among the mean deduction scores attained by students assigned to the three classroom programs.

9. On the Post-Test for Traffic Analysis, no significant differences at the .05 level existed among the mean scores attained by students assigned to the three classroom programs. However, significance was found at the .10 level of confidence between the thirty hour classroom plus fifteen hour drivocator program and the forty-five hour classroom program in favor of the thirty hour classroom plus fifteen hour drivocator program.

The following is a summary of the findings for differences between female and male students on the six criterion measures.

1. On the Pre-Test for Driving Knowledge, no significant difference was found between the mean scores attained by female or male students.
2. On the Post-Test for Driving Knowledge, a significant difference at the .001 level of confidence existed between the mean scores attained by female and male students, in favor of the male students.
3. There was a significant gain in the mean scores from the Pre-Test for Driving Knowledge to the Post-Test for Driving Knowledge attained by both female and male students.
4. On the Post-Test for Driving Performance - Total, a significant difference at the .01 level of confidence existed between the rejection rates of female and male students taking the McGlade Road Test,[24] with the female students having a higher frequency

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[24] McGlade, loc. cit.

of rejection than the male students. Further analysis suggested that no significant classroom X sex or laboratory X sex interactions exist.

5. On the Post-Test for Driving Performance - Total, a significant difference at the .01 level of confidence existed between the failure rates of female and male students taking the McGlade Road Test,[25] with the female students having a higher frequency of failure than the male students. Further analysis suggested that no significant classroom X sex or laboratory X sex interactions exist.
6. On the Post-Test for Driving Performance - Total, a significant difference at the .001 level of confidence existed between the mean scores attained by female and male students, with the female students having a higher mean deduction score than the male students.
7. On the Post-Test for Driving Performance - Part I, a significant difference at the .001 level of confidence existed between the mean scores attained by female and male students, with the female students having a higher mean deduction score than the male students.
8. On the Post-Test for Driving Performance - Part II, a significant difference at the .001 level of confidence existed between the mean scores attained by female and male students, with the female students having a higher mean deduction score than the male students.

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[25] Ibid.

9. On the Post-Test for Traffic Analysis, a significant difference at the .025 level of confidence existed between the mean scores attained by female and male students, with the female students having a higher mean score than the male students.

There were no interactions among the factors in the analysis, although a three-way interaction between laboratory, classroom and sex approached significance at the .05 level of confidence on the Post-Test for Driving Knowledge and the Post-Test for Driving Performance. However, on the supplemental analysis of the Post-Test for Driving Knowledge, after eliminating the five extreme scores, significance at the .05 level of confidence did exist both in the two-way interaction between classroom and sex and in the three-way interaction between laboratory, classroom and sex.

The coefficients of intercorrelation among the six criterion measures were significant at the .05 level of confidence or higher except for the following: Post-Test for Driving Performance - Part II vs. Pre-Test for Driving Knowledge, Post-Test for Driving Performance - Part II vs. Post-Test for Driving Knowledge, and Post-Test for Traffic Analysis vs. Post-Test for Driving Performance - Part I.

An expected high correlation resulted between each part score and the total score on the Post-Test for Driving Performance. The low correlation between the two parts of the Post-Test for Driving Performance is an indication that the two parts measure different components of the driving task.

A low correlation resulted between the Post-Tests for Driving Performance and the Pre- and Post-Tests for Driving Knowledge. A low correlation also existed between the Post-Test for Traffic Analysis and the Pre- and Post-Tests for Driving Knowledge.

CHAPTER V

SUMMARY AND CONCLUSIONS

As treated in the preceding chapters, this investigation was designed to examine the relative effectiveness of four selected driver and traffic safety education laboratory programs; three selected driver and traffic safety education classroom programs; and to determine if the relative effectiveness of the laboratory and classroom programs is different for female and male students. The largest high school in the State of Washington was selected for the experimental procedure to insure an adequate study sample. Precautions were taken to assure that no one phase of instruction or instructional treatment group would receive superior or inferior instruction. This was accomplished by randomly assigning students to the twelve instructional treatment groups, an intensive four-month in-service education program of the instructors, the development of driving procedures and teaching points, and regularly scheduled staff meetings throughout the entire project.

While applied specifically to the State of Washington, hopefully the results of this study, together with the findings and conclusions of similar investigations, will assist school administrations and instructors, both in Washington and in other states, in their quest for quality driver and traffic safety education programming.

Criterion Measures

This investigation examined selected laboratory and classroom programs, and the significance of the sex factor on the criterion measures. Criterion measures used for its evaluation were grouped into three evaluative categories.

Knowledge Tests - The National Test in Driver Education (Special Form)[1] was used for evaluating knowledge, and was given to all students in the study prior to and at the conclusion of the instructional program. The increase in mean scores from the Pre-Test for Driving Knowledge to the Post-Test for Driving Knowledge was significant at the .001 level of confidence for each laboratory program, each classroom program, female students and male students, although the increase in mean scores for each group was unexpectedly low.

A review of the National Test in Driver Education (Special Form)[2] and of the classroom lesson plans was made to determine the relevancy of the driving knowledge examination questions to the subject material taught. An evaluation of the test items revealed that answers to three of the test questions were not covered in the instructional outline. Also, the answers to ten other questions were only covered as a general topic of information and were not spoken to directly, although they were generally covered in outside reading assignments.

An evaluation of the classroom lesson plans revealed that most of the major areas were covered to some extent by the test questions. Some of the topics that received inadequate attention relative to the extent they were covered in the course were: (1) the various aspects of traffic engineering, (2) alcohol and the driver, (3) driving procedures, (4) loading and pulling a trailer, (5) travel planning, (6) various types of driving relative to the organizational structure of the program, (7) traffic citizenship, and (8) the test questions did not draw a relationship between the different instructional topics in the course.

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[1] National Test in Driver Education (Special Form; New York: New York University, Center for Safety Education, 1967).

[2] Ibid.

Driving Performance Test - The McGlade Road Test[3] was utilized for evaluating driving performance. This evaluation instrument was used as a Total Test and was also divided into two parts. Part I contained those items which were primarily designed to evaluate manipulative skills. Part II items pertained to perceptual skills.

The test also provided for the rejection and/or failure of students. The Road Test was terminated if the student was involved in an accident, committed a dangerous action, committed a clear violation of any traffic law, exhibited a lack of cooperation, or refused to perform as instructed by the examiner.[4] A student who received more than fifty-four deduction points failed the test. It should be remembered that deduction points work in a reverse order - the lower the deduction points, the better the score.

Traffic Analysis Test - Criterion measures are generally structured around true-false, completion, matching or multiple choice questions which ask the student to provide rote answers. These types of tests do not satisfactorily measure the student's ability to comprehend and apply the knowledge he has acquired. The Traffic Analysis Test was developed for this study to provide a measure of a student's ability to draw a meaningful relationship between the causes of an accident and how the accident might have been prevented. The premise on which this test was developed was more than a feedback of knowledge which the student had acquired. Rather, it was an opportunity for the student to apply his knowledge to factors which contributed to the cause of the accident.

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[3] Francis S. McGlade, A New Road Test for Use in Driver Licensing, Education and Employment (New York: New York University, Center for Safety Education, 1961).

[4] *Ibid.*, p. 13.

Intercorrelations - Most of the coefficients of intercorrelation among the six criterion measures were significant at the .05 level of confidence. The two highest correlation coefficients (.842 and .796) represent an expected relationship between each part score and the total score on the driving performance test.[5] The relatively low correlation coefficient of .343 between the two parts of the driving performance test is an indication that those parts do, as defined, measure different components of the driving task.

The low correlations between the driving performance tests and the knowledge test[6] indicate no practical relationship between these two measures. The .304 and .310 correlation coefficients between the Post-Test for Traffic Analysis[7] and the Pre- and Post-Tests for Driving Knowledge indicate a very minor overlap in these two factors.

Results of Pre-Test for Driving Knowledge

The mean scores that students made on the Pre-Test for Driving Knowledge were not significantly different among the laboratory or classroom programs or between the sexes. The fact that the F value among the laboratory and classroom programs was <1 strongly supported the technique of randomly assigning students to the twelve instructional treatment groups.

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[5] Ibid.

[6] National Test in Driver Education, loc. cit.

[7] "You Are the Jury" Traffic Analysis Test, developed as a part of this investigation as described in Chapter III, pp. 78-82.

Discussion of Findings

Laboratory Program - Laboratory techniques have received more research attention than any other phase of instruction in driver and traffic safety education. However, many of these studies have been limited to driving performance in some type of laboratory or behind-the-wheel instruction, and have not concerned themselves with the effect that different laboratory programs have on knowledge.

No significant difference among the mean scores on the Post-Test for Driving Knowledge was found among the laboratory programs. These results were similar to those obtained on a Post-Test for Driving Knowledge by Nolan[8] and Gustafson,[9] but differed from the results obtained by Seals who found significant differences between the range and four-phase programs. Seals did not find a significant difference between the standard and range programs.[10]

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[8] Robert O. Nolan, "A Comparative Study of the Teaching Effectiveness of the Multiple Car Off-Street Driving Range and the Aetna Drivotrainer" (synopsis of an unpublished doctoral dissertation, Michigan State University, 1964), pp. 12-14.

[9] Robert E. Gustafson, "A Study to Compare the Effectiveness of Instruction in the Allstate Good Driver Trainer and on the Multiple Car Off-Street Driving Range with the Multiple Car Off-Street Driving Range" (an abstract of an unpublished doctoral dissertation, Michigan State University, 1965), p. 2.

[10] Thomas A. Seals, "An Evaluation of Selected Driver and Traffic Safety Education Courses" (unpublished doctoral dissertation, Florida State University, August, 1966), pp. 62-64.

Perhaps a more sensitive knowledge test with a higher reliability coefficient would have produced a significant difference among the four laboratory programs in this investigation. A knowledge test developed around performance objectives or several knowledge tests developed with performance objectives as their base might produce a clearer insight into the effects that different laboratory programs have on knowledge.

There were no significant differences among the laboratory groups in the rejection or failure rates on the McGlade Road Test which was utilized for evaluating driving performance.[11]

As a result of the rejections on the McGlade Road Test, only 693 students had usable driving performance scores. An unweighted means analysis of variance of these mean deduction scores revealed significant differences among the driving performance of students in the laboratory programs. Students in a standard program, or a combination of a standard and a range program, had significantly fewer points deducted than students in a simulator program only.

The mean deduction scores on both the Total and Part I (manipulative skills) of the McGlade Road Test for students in the simulator program were significantly larger than those for students in a standard program. Mean deduction scores for perceptual skill items were not significantly different among students assigned to any one of the four laboratory programs.

The findings of this investigation are not in complete accord with results of previous studies comparing simulator programs with other laboratory programs. Other studies using driving performance tests have shown simulation programs to be equal to or possibly better than the standard program. However, Gustafson found that students enrolled in a range program, followed by two hours on-street instruction, scored significantly higher on the vehicle handling section of the final road test than students enrolled in a combination simulator-range program followed by two hours on-street instruction.[12]

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[11] McGlade, loc. cit.

Proponents of simulation have cited the value of simulators in the development of perceptual skills. This investigation revealed no significant differences among the respective laboratory programs treated, with regard to this important aspect of driving. The fact that differences occurred on the Total and Part I of the McGlade Road Test is not easily explained in view of past research. The most credible explanation appears to lie in the inverse relationship between the mean deduction scores and the number of hours of driving instruction in an automobile, both as the operator and as an observer, in either the on-street or range phase of the program (Table XLV). Apparently, the additional instruction time in the automobile improves the manipulative skills needed in the operation of an automobile.

The same parallel between the number of hours of driving instruction in an automobile and the mean deduction scores does not exist on Part II of the Post-Test for Driving Performance (Table XLV). Apparently, the experiences which students received in the standard program did not have as much influence on the perceptual skills as was evidenced in the simulator, range, and four-phase programs. This suggests that simulation instruction may substitute adequately for behind-the-wheel experience in the attainment of perceptual skills, but perhaps not in the development of manipulative skills.

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[12] Gustafson, op. cit., p. 4.

TABLE XLV

PARALLEL BETWEEN MEAN DEDUCTION SCORES ON THE POST TEST FOR DRIVING PERFORMANCE AND NUMBER OF HOURS OF INSTRUCTION IN THE AUTOMOBILE AMONG THE LABORATORY PROGRAMS

Laboratory Program	Mean Deduction Scores Part I	Part II	Total	Number of Hours of Instruction in the Automobile
Standard	21.89	18.12	40.01	18
Range	23.82	17.71	41.53	17
Four-Phase	24.63	17.66	42.29	14
Simulator	26.73	20.15	46.89	9

As in the knowledge test, a driving performance test developed around performance objectives or several driving performance tests based on performance objectives might represent a better evaluation of the driving task than the McGlade Road Test. Although the McGlade Road Test is considered to be one of the best of the driving performance tests presently available, there are certain aspects of the driving task which are not included. The criticism being focused on driver and traffic safety education today is partially a result of our failure to identify those elements or patterns of instructional activity in simulation, classroom, multi-media, driving ranges or on-street instruction that contribute to those aspects of driving which are essential to the driving task.

The Post-Test for Traffic Analysis did not reveal any significant differences among the mean scores of students assigned to the different laboratory programs. The results seem to indicate that students in all four laboratory programs are equally capable of analyzing a traffic accident, determining the causes of the accident, and suggesting how the accident could have been prevented.

Why all the bother and concern over the effectiveness of different laboratory programs? What difference does it make which type of laboratory program a student receives? First, and of primary importance, school administrations and instructors desirous of improving their driver and traffic safety education programs are searching for new and additional knowledge which will give them the best possible program for their particular, and possibly unique, situation. A program which is highly successful at one school might not satisfy the requirements and characteristics of another school. The number of students, available space, qualifications of instructors, and a multitude of other variables dictate the type of driver and traffic safety education program a school should develop.

The second question is one of economics. The laboratory program is the most expensive phase of instruction. With an ever-increasing number of students taking driver and traffic safety education in schools, it is imperative that more efficient and economical methods of instruction be developed. The results of this investigation have substantiated the findings of previous research which have indicated that range, simulator, and four-phase programs are as effective as the standard program.

The major factor affecting the cost of the laboratory program is the salary of the instructor. In the standard program, a one-to-one teaching ratio affects the number of instructors needed in the program. In a simulator, range, or four-phase program, a greater teaching ratio, often as high as one-to-twelve, will reduce the number of instructors or the equivalent of full-time instructors needed to operate the program. Table XLVI shows the difference in the number of instructors and cost per pupil between a standard program, a simulator program, a range program, and a four-phase program. (See Appendix F for explanation of procedure for arriving at number of instructors and cost per pupil.) Table XLVI is used as an example only. The 360 students used in arriving at the number of instructors needed and the per pupil cost do not represent a minimum or ideal number of students for simulator, range, or four-phase programs. The number of class periods are based on fifty-four minute classes, and they represent the number of periods needed to satisfy the hours of instruction for each of the programs.

TABLE XLVI

DIFFERENCE IN THE NUMBER OF INSTRUCTORS AND PER PUPIL COST FOR A STANDARD PROGRAM, A SIMULATOR PROGRAM, A RANGE PROGRAM, AND A FOUR-PHASE PROGRAM

Program	Number of Instructors	Per Pupil Cost
Standard		
6 hours on-street (20 class periods)	3.3	$73.33
Simulator		
12 hours simulation (13 class periods) 3 hours on-street (10 class periods)	2.4	53.33
Range		
6 hours range (8 class periods) 3 hours on-street (10 class periods)	2.2	48.89
Four-Phase		
8 hours simulation (9 class periods) 6 hours range (8 class periods) 2 hours on-street (7 class periods)	2.0	44.44

As shown in Table XLVI, simulator, range, and four-phase programs are all less expensive to operate than the standard program. The cost for the construction and/or purchase of a simulator and/or off-street multiple car driving range can be amortized over a three-to-five year period for a school having an annual enrollment of approximately three hundred sixty students in a school-day driver and traffic safety education program. A school expending $50,000 for the purchase and construction of a simulator and range in the development of a four-phase program could amortize the cost in less than five years (see Appendix F). A school with more students, or a combination of several schools which would total more than three hundred sixty students taking driver and traffic safety education each year, could amortize the cost for purchase and/or development of facilities for a simulator, range, or four-phase program in less time.

However, school administrations and instructors should not think only of simulator, range, or four-phase programs as means of reducing the cost of instruction. Their first and primary concern should be the improvement of their driver and traffic safety education program. Part of the instructor salary savings should be returned to the program for the purchase and development of audio-visual equipment, multi-media equipment, film libraries, transparencies and overlays, teaching aids, up-to-date textbooks, and other equipment needed for a quality program of driver and traffic safety education.

Classroom Program - Although the classroom phase of instruction in high school driver and traffic safety education has been virtually neglected in past research, it is encouraging to note interest which has recently been given to this most important phase of the program. Examples of this interest are: The Wisconsin Classroom Curriculum Instructional Driver Education Workshop,[13] studies on the EDEX Learning System (Drivocator),[14] and encouragement by Mann to utilize the technique of small group discussions as a method of instruction.[15] However, that which probably contains the greatest implications for influencing classroom instruction in driver and traffic safety education is the Automotive Safety Foundation Driver Education Curriculum Study and Development Project.[16]

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[13] Wisconsin Department of Public Instruction, Wisconsin Classroom Curriculum Instructional Driver Education Workshop Proceedings, June 15-17, 1967 (Madison: Wisconsin Department of Public Instruction), p. 40.

[14] "Something New in Safety," EDEX Teaching Systems (Mountain View, California: EDEX Corporation), p. 2.

As stated earlier, this investigation was designed, in part, to investigate several questions concerning classroom instruction: Is additional time needed in the classroom phase of instruction in driver and traffic safety education? How can the additional time in the classroom best be spent? Complete answers to these two questions have not evolved. However, results of this investigation do provide new insight into the problem.

Results of this investigation indicate that fifteen hours of additional time in the classroom, studying the same content, materials, and utilizing the same techniques of instruction, did not result in significantly higher mean scores on the post-criterion measures. However, when fifteen hours of drivocator instruction were added to a thirty hour classroom program, significant differences on the Post-Test for Driving Knowledge, and the Post Test for Traffic Analysis were found, in favor of the Drivocator Program. The results did not show any significant differences on the criterion measures between the thirty hour classroom and forty-five hour classroom programs. No significant differences among the classroom programs were revealed on the mean deduction scores or the rejection and failure rates on the Post-Tests for Driving Performance.

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[15] William A. Mann, "Let's Talk It Over," Analogy (Charter Issue; Skokie, Illinois: Allstate Insurance Company), pp. 4-9.

[16] A Driver Education Curriculum Study and Development Project sponsored by the Automotive Safety Foundation.

The results of this investigation indicate that the drivocator system made a significant contribution to classroom instruction within the design and controls of this investigation.

The supplemental analysis of the Post-Test for Driving Knowledge data, after eliminating five extreme scores, did not result in a change in the level of significance among the classroom programs or between female and male students. However, the elimination of the extreme scores did result in significance at the .05 level of confidence in the two-way interaction between classroom and sex and a three-way interaction between classroom, laboratory and sex.

An inspection of mean scores (Table E, Appendix G) in the two-way interaction between classroom and sex indicates that the difference between female and male students is less in the drivocator group than the thirty hour or forty-five hour classroom groups. This may suggest that the drivocator or multi-media approach to instruction benefits female students more than males.

An inspection of mean scores in the three-way interaction between classroom, laboratory, and sex did not produce any viable explanation for this interaction.

Female and Male Students - Very little effort and investigation have hitherto been devoted to the relative needs of female and male students in driver and traffic safety education courses. One of the stated objectives of this investigation was to determine whether the relative effectiveness of the laboratory and classroom programs is different for female or male students. One of the most consistent results throughout this investigation was the highly significant differences (.001) in the post-test mean scores on the driving knowledge and driving performance tests between female and male students in favor of the male students.

Other investigations have produced similar results. Hayes concluded, "the average girl apparently commences driver training at a much lower point on the skills continuum than does the average boy."[17] Bernoff found that drivotrainer boys exceeded drivotrainer girls significantly in specific driving knowledge and the boys surpassed the girls on the road test at the .10 level.[18] Nolan found that drivotrainer and multiple car boys had significantly better scores than drivotrainer and multiple car girls on a post-test for general driving knowledge. He also found that the drivotrainer boys out performed the drivotrainer girls at the .02 level of significance in mean road test scores for vehicle handling and road problems.[19] A report from Project Talent indicated that boys seem to acquire significantly more information than girls in many areas.[20] Loft recommended that, "a study be made to determine if driver education courses should have any different content and/or methodology for girls and/or boys."[21]

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[17] Robert B. Hayes and others, Immediate Standardized Learning Reinforcement to a Complex Mental-Motor Skill (Driver Training) Using Electronically-Coordinated Motion Pictures (Abstract, Title VII Project No. 1090; Washington: U. S. Department of Health, Education, and Welfare, 1965), p. 2.

[18] Louis I. Bernoff, An Experimental Study of the Teaching Efficiency of the Aetna Drivotrainer System (Hartford, Connecticut: Aetna Life and Casualty, June, 1958), pp. 7-8.

[19] Nolan, op. cit., pp. 1-2.

The only criterion measure where the female students were significantly superior to the male students was in the Post-Test for Traffic Analysis where the female students had significantly higher mean scores at the .025 level of confidence. This result of the investigation represents a reversal in female-male differences on the post-test criterion measures. While there is no clear cut reason for this difference, several possible explanations exist. The Traffic Analysis Test measures more than a feedback of knowledge. It provides the student with a means of applying the knowledge he has acquired. The low intercorrelations between the Traffic Analysis Test and the knowledge and driving performance tests indicate that the Traffic Analysis Test is measuring some cognitive factors not included in the other criterion measures. The female students in this investigation were better able to apply their knowledge as it related to the possible prevention of the accident. If this were true generally, it could be a factor along with the amount of driving and differences in the time, place, and circumstances of driving, which result in women having fewer automobile accidents and deaths per miles driven.[22]

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[20] "Cognitive Growth During High School," A National Longitudinal Study of American Youth - Project TALENT, Bulletin No. 6 (April, 1967), p. 1.

[21] Bernard I. Loft, "The Effects of Driver Education on Driver Knowledge and Attitudes in Selected Public Secondary Schools," Traffic Safety Research Review (June, 1960), p. 15.

[22] National Safety Council, Accident Facts (1968 Edition; Chicago: National Safety Council, 1968), p. 55.

On the other hand, it is possible that the results could be an artifact of the testing procedure, where female students are better able to express in writing their analysis and accident prevention solutions.

Although not conclusive, the results of this and previous investigations support the need for evaluating the present curriculum in driver and traffic safety education in an effort to ferret out the variables in driving knowledge and driving performance and female students in the analysis of traffic accidents which contribute to the greater achievement of male students. Research is needed to determine where differential content emphasis and time allocation for both female and male students is needed to compensate for any deficiencies affecting the driving task.

What different techniques of instruction or organization of the various phases of instruction will reduce the differences on post-test criterion measures between female and male students? Would a large amount of classroom instruction early and laboratory instruction late produce different results than a large amount of laboratory instruction early and most of the classroom instruction later in the course? Would either of these produce results different than a totally correlated and integrated program in driver and traffic safety education? Answers to these questions are needed to determine the needs of both female and male students if a differential curriculum and/or time allocation in driver and traffic safety education is to be developed. This could also provide information relative to a better type of classroom and laboratory organization for all students.

Conclusions

As a result of this investigation, the following conclusions have been reached:

1. The no significant difference result on the Post-Test for Driving Knowledge among the laboratory programs seems to indicate that:
    a. laboratory instruction in a standard, simulator, range, or four-phase program has no significant effect on the amount of driving knowledge attained by students; or
    b. the knowledge test used in the study was not sensitive enough to measure the influence that the different laboratory programs had on the attainment of driving knowledge by students.
2. The number of hours of instruction in an automobile whether on the range or on-street seems to have a direct relationship to the development of manipulative skills. On the other hand, the results of this investigation suggest that perceptual skills may be developed through simulated as well as actual driving experiences.
3. The results of the Post-Test for Driving Performance suggest that simulation instruction as defined in this investigation may substitute adequately for a portion of behind-the-wheel instruction in the attainment of perceptual skills, but perhaps not in the development of manipulative skills.
4. A simulator, range, or four-phase program, as defined in this investigation, provides as good a basis as the standard program for the development of a driver and traffic safety education program.

5. Fifteen hours of additional classroom time, utilizing the same content, materials, and instructional techniques, did not result in a significant difference in driving knowledge among the classroom groups. However, fifteen hours of additional classroom time utilizing the Drivocator System resulted in a significant difference in driving knowledge, in favor of the classroom plus Drivocator program. Therefore, the results of this investigation plus that of previous studies seem to indicate that the Drivocator System, using an immediate response-feedback concept, provides a quality base for the expansion of the classroom phase of driver and traffic safety education.
6. The results of this and previous investigations seem to indicate a differential between female and male students in the acquisition of competencies related to the driving task.
7. Simulation, range, and four-phase programs reduce the per-pupil cost of instruction.

Recommendations

As a result of this and previous investigations, the following recommendations should be considered:

1. School administrations and instructors of driver and traffic safety education should seriously consider simulator, off-street multiple car driving range, and/or four-phase laboratory programs in the expansion and improvement of their driver and traffic safety education courses.
2. In the expansion and improvement of the classroom phase of instruction, it is important to consider more than additional hours of

instruction. Consideration should also be given to the Drivocator System used in this study or other multi-media systems, small group discussions, television, programmed texts, transparencies and overlays, magnetic tapes, time-lapse photography, films, and other audio-visual aids.

3. Due to the many variables influencing off-street multiple car driving range instruction, no ratio of on-street to range hours is suggested. However, state departments of education often find it necessary to establish such criteria for course approval. When this is the case, it is strongly recommended that each program be evaluated individually rather than a fixed ratio of on-street to range hours. Criteria for evaluation should consider the size of the range, type and number of different experiences (both skill and perceptual), number of vehicles the area can effectively use, space and distance provided for different maneuvers and simulated traffic experiences, adequacy of the communication system, and the effectiveness of the instructor operating the range.
4. School administrations and instructors of driver and traffic safety education should critically evaluate the experiences that students in their classroom and laboratory programs are receiving. This is especially true in on-street instruction when it is supplemented by laboratory experiences received in simulators and/or off-street multiple car driving ranges, so that unnecessary duplication of driving experiences can be prevented and gaps filled which relate to the driving task.
5. Consideration should be given to the development of programs in driver and traffic safety education which will provide the

additional time, content, and experiences to compensate for the differences in knowledge and driving skill (manipulative and perceptual) between female and male students.

6. There is a need for the development of a highly sensitive driving knowledge and driving performance test or a series of tests based on performance objectives to adequately evaluate certain types of driving situations and experiences.

Suggested Research

The results of this investigation have suggested the need for additional research:

1. A study to investigate the relative effectiveness of the Drivocator System as the basis of a classroom program of instruction.
2. A study to evaluate the advantages of a correlated program of classroom and laboratory experiences based on the performance objectives of various driving situations such as residential, city, highway, expressway, and driving emergencies.
3. A study to determine at what stage in the development of student competencies, the advantages of simulation can best be realized.
4. As a result of the relationship shown in this investigation between the development of manipulative skills and the number of hours of driving instruction in an automobile, a study should be conducted to further determine the nature of this relationship and the amount of driving time needed in the development of these manipulative skills.
5. A study to evaluate the present curriculum in driver and traffic safety education in an effort to ferret out the variables which

contribute to differences in achievement between female and male students.

6. A study to determine where differential content emphasis and time allocation for both female and male students is needed to compensate for any deficiencies affecting the driving task.
7. A study to evaluate different organizational structures used in driver and traffic safety education courses, both classroom and laboratory instruction.
8. A study to further refine and explore the applicability of the Traffic Analysis Test as an evaluation instrument in driver and traffic safety education.
9. A follow-up study to serve as a sequel to this investigation utilizing this study sample.

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APPENDIX A

Driving Procedures

Teaching Points

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

PRE-IGNITION

1. Unlock automobile.
2. Enter, close and lock doors, and provide for ventilation.
3. Put key into ignition.
4. Adjust seats and mirrors.
5. Driver, check to see that all doors are closed and locked.
6. Fasten seatbelts.
7. Check parking brake - it should be on.
8. Place gear selector lever in "park."

STARTING THE ENGINE

1. Place left foot on brake.
2. Turn key to "on" position.
3. Check all gauges to see if they are functioning properly.
4. Depress accelerator slightly.
5. Turn key to "start" position.
6. When engine starts, release key and accelerator pressure.
7. Recheck all gauges.

PUTTING THE CAR IN MOTION

1. Move selector lever to proper position.
2. Release parking brake.
3. Check traffic and signal.
4. Make a head check of the blind spot.
5. When safe, release foot brake and accelerate to move into traffic.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

BRAKING

1. To signal for a decrease in speed, use arm signal or touch brake pedal lightly two or three times.

2. Braking pressure should be smooth and constant.

3. If car starts to skid while braking, release brake pressure and steer in the direction of the skid.

4. Never apply brakes on ice.

5. If braking pressure is necessary on a turn or curve, pressure should be applied prior to entering the turn or curve.

6. Avoid locking wheels while braking.

7. Generally, steering is more effective than braking in avoiding difficult traffic situations.

8. The left-foot braking technique is particularly effective while parking, in congested traffic, and in approaching possible hazardous traffic situations.

9. The proper procedure for left-foot braking is to poise the left foot above the brake pedal not touching the brake pedal, until brake pressure is necessary.

STOPPING THE CAR

1. Check traffic behind with mirrors.

2. Signal.

3. Release accelerator pressure.

4. Apply necessary braking pressure for a smooth rate of deceleration.

5. Prior to stopping, release brake pressure and immediately reapply.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

SECURING THE CAR

1. After stopping, move selector lever to "park."
2. Set parking brake.
3. Turn ignition to "off" position.
4. Remove key.
5. Release seatbelts and close windows.
6. Exit safely from automobile.
7. Lock all doors.

BACKING THE CAR

1. Place left foot on brake and turn shift selector to reverse.
2. Place right elbow on top of seat.
3. Place left hand at top of steering wheel.
4. Check traffic and look out rear window over right shoulder.
5. Turn steering wheel in the direction you want the rear of the car to move.
6. Continue looking out the rear window while backing until you come to a complete stop.
7. Sharp turns require hand-over-hand steering.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

TURNS

1. Check rear view mirror and signal well in advance of turn.
2. Position car in correct lane.
3. Reduce speed for safe control on turn.
4. Check traffic and pedestrians - left, right, left.
5. Execute turn - using hand-over-hand steering.
6. Accelerate gently and unwind steering wheel.
7. Enter the nearest permissible lane or the lane corresponding to the one just vacated.
8. For left turn - begin turning when driver enters nearest lane of traffic (two-lane street).
9. For right turn - begin turning when front wheels are opposite the point where the curb begins to curve.

INTERSECTIONS (Controlled and Uncontrolled)

1. Position car in proper lane.
2. If conditions so demand, reduce car speed.
3. Check traffic controls.
4. Cover brake.
5. Make a visual check of intersection - left, right, left.
6. If safe, proceed through intersection.
7. Resume or continue safe driving.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

LANE CHANGING

1. Check traffic and mirrors.
2. Signal.
3. Head check (blind spot).
4. Accelerate as you move into the appropriate lane.
5. Hand cancel directional signal if necessary.
6. Adjust speed to traffic conditions.

PASSING - TWO-LANE ROAD

1. Check traffic and road conditions before attempting to pass.
2. Check for safe passing distance.
3. Close gap in preparation for pass.
4. Recheck traffic, road, and distance.
5. Signal for left turn.
6. Check blind spot and, if necessary, sound horn.
7. Accelerate as you move into the left lane.
8. Continue in the passing lane until you can see, in the rear view mirror, the front end of the car you are passing.
9. Signal for right turn.
10. Make a head check right and return to the right lane when safe.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

"Y" TURNS

1. Check traffic.
2. Signal for stop.
3. Position car near right edge of roadway and stop.
4. Signal for left turn.
5. Check blind spot.
6. When safe, move slowly forward, turning full left.
7. When approximately 18 inches from the curb, turn full right and stop before touching curb.
8. Shift to reverse, and back to a point approximately 18 inches from the rear curb.
9. Turn the steering wheel sharply left and stop before touching the curb.
10. Shift to drive.
11. Check traffic and enter proper lane.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

PARKING ON AN UPGRADE WITH A CURB

1. Check rear view mirror and signal for stop.
2. Pull over parallel to and within six inches of the curb and stop.
3. Shift to neutral.
4. Let car roll back slowly, turning wheels away from curb until tire just touches curb.
5. Shift into park and complete proper securing procedure if you leave the car.

PARKING ON A DOWNGRADE WITH A CURB

1. Check rear view mirror and signal for stop.
2. Pull over parallel to and within six inches of the curb.
3. Let car roll forward slowly, turning wheels sharply toward the curb until the tire touches the curb lightly.
4. Shift into park and complete proper securing procedure if you leave the car.

PARKING ON A GRADE WITHOUT A CURB

1. Check rear view mirror and signal for stop.
2. Pull over parallel to and within six inches of edge of roadway.
3. While moving slowly, turn wheel sharply toward the edge of the roadway.
4. Shift into park and complete proper securing procedure if you leave the car.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

ANGLE PARKING (Right Side of Street)

1. Check rear view mirror and signal intention to slow down.
2. Give right turn signal.
3. Place yourself in lane next to parked cars.
4. Slow down and move car to far inside (left) of your lane as possible.
5. When driver is even with the first line (extended) of the parking stall, turn car into stall.
6. As car moves into the center of the space, straighten the wheels.
7. Let car move slowly forward until the tires touch curb lightly, or until front of car is even with end of parking stall.
8. Shift into park and complete the proper securing procedures if you leave the car.

PERPENDICULAR PARKING (Right Side of Street)

1. Check rear view mirror and signal intention to slow down.
2. Place yourself in the second lane from the parked cars.
3. Check blind spot (over right shoulder) for traffic clearance before starting turn.
4. When front bumper is even with the first line (extended) of the parking stall, turn car very sharply to the right into the stall.
5. As the car moves into the center of the space, straighten the wheels.
6. Let car move slowly forward until the tires touch the curb lightly, or until front of car is even with end of parking stall.
7. Shift into park and complete the proper securing procedures if you leave the car.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

TO LEAVE ANGLE PARKING SPACE

1. Slowly move car straight back, checking traffic. STOP WHEN NECESSARY.
2. When car is about halfway out of parking space, and when left front bumper will clear car on the left, turn steering wheel hard right.
3. Back into correct lane and straighten wheel before stopping.
4. Continue to look backward until you have come to a complete stop except when you check clearance of pedestrians and cars in adjacent parking stalls.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

PARALLEL PARKING (Right Side of Street)

1. Approach parking space in correct lane.
2. Slow speed.
3. Give appropriate stop signal.
4. Brake appropriately.
5. Stop two feet away and parallel to the other car with your back bumpers even.
6. Shift to reverse.
7. Back slowly, turning wheels all the way to the right.
8. When you establish a straight line between the center of your rear window and a spot approximating the right front headlight of the parked car to the rear, straighten the wheels and continue backing.
9. When the front bumper of your car is even with the rear bumper of the other car, turn sharply to the left.
10. Stop before touching rear car.
11. Shift to drive.
12. Move forward slowly, straighten wheels, and center car.
13. If leaving automobile, follow proper procedures for securing the car.

LEAVING PARKING SPACE

1. Shift to reverse, release parking brake, and back slowly.
2. At a point approximately one foot from the parked car behind, turn the steering wheel sharp left.
3. Shift to drive.
4. Give arm signal.
5. Check traffic over left shoulder.
6. When safe, move forward slowly into nearest lane, while checking clearance of right front fender.
7. Give head check over right shoulder to check clearance of parked car.

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WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVING PROCEDURES

DRIVING IN ADVERSE WEATHER CONDITIONS (Rain, Fog, Snow, and Ice)

1. Drive at reduced speed.
2. Make no sudden changes in speed or direction.
3. Whenever possible, steer around an object instead of braking to avoid the object.
4. To slow down, apply a light steady pressure on the brake pedal. If distance permits, pumping the brake pedal lightly two or three times per second is permissible (rain, snow, and ice).
5. Do not lock brakes.
6. Plan ahead to avoid sudden stops or lane changes.
7. In starting, for optimum traction, accelerate gradually. Use appropriate gear.
8. When possible, keep car moving.
9. Do not reduce speed to point where normal flow of traffic is impeded.
10. Stopping distance on wet pavement, snow, and ice can be nine times greater than that required on dry pavement.
11. Turn on headlights if visibility is reduced significantly.
12. Turn on defrosters when windows or windshield start to accumulate fog. This condition indicates need for circulation of air inside automobile.
13. Periodically check and remove ice, mud, and slush from wheel wells, lights, and car windows.
14. Carry tire chains in car when anticipating driving in snow or icy conditions. Put chains on rear wheels when driving on compact snow and ice, when your tires start losing traction. Use chains at all times when "chains required" signs are displayed.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

TEACHING POINTS

PRE-IGNITION

1. Observe the auto's condition and surroundings. This includes a visual check to the front, rear, and both sides of the car for:
    (a) Obstructions, i.e., toys, rocks, nails, etc.
    (b) General mechanical condition
2. Car should be locked; driver unlocks car and sees to it that doors are locked again after everyone has entered the car.
3. Driver should insure that all seatbelts are fastened and proper ventilation is provided.

STARTING THE ENGINE

1. If engine is very cold, press accelerator to the floor once and release.
2. If gauge or gauges indicate difficulty, take appropriate action - explain alternatives. (3 & 7)
3. Left foot should remain on the service brake during the entire starting procedure.

PUTTING THE CAR IN MOTION

1. Enter traffic in the nearest available lane.
2. Remind the student to aim high in steering.

BRAKING

1. All students should initially be taught the left foot braking technique. Right foot braking is allowable after the "Rural Trip" is complete.

STOPPING THE CAR

1. If lane change is required, check blind spot.
2. Arm signals and pumping brakes should be both taught. (2)

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

TEACHING POINTS

SECURING THE CAR

1. Check to see if headlights and accessories are turned off when securing car.

BACKING THE CAR

1. Sound horn before moving if conditions warrant, and always when backing from a garage or driveway.
2. A slight movement of the steering wheel will result in a considerable change of direction.
3. (a) If you wish the back end of the vehicle to go to the right, turn wheel to the right.

   (b) If you wish the back end of the vehicle to go to the left, turn wheel to the left.
4. When backing straight, look over right shoulder, concentrate on a fixed object at destination, and back toward it.
5. When backing, move at a slow controlled speed.
6. When turning while backing, use the hand-over-hand steering technique.
7. When turning while backing, frequently check traffic and front fender clearance.

TURNS

1. Signal a minimum of 100 feet, or half a block, from an intersection.
2. Position the car in the proper lane. If a lane change is needed, emphasize proper lane change procedure.
3. Reduce speed to between 5 and 10 mph before starting to turn.
4. If necessary to stop or yield, keep the wheels straight while stopping or yielding.
5. At midpoint of turn, accelerate gradually.
6. When turning, use the hand-over-hand steering technique.
7. Turns are permitted at red lights after stopping and yielding, except for left turns onto two-way streets.
8. As a student's skill progresses, the teacher may allow automatic wheel return.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

TEACHING POINTS

INTERSECTIONS (Controlled and Uncontrolled)

1. Never enter an intersection at such a speed that you could not stop or avoid a collision.
2. The car on the right has the right-of-way unless your car, or some other car, has already entered the intersection.
3. While stopped at an intersection, apply sufficient brake pressure to avoid creeping ahead.
4. Slowest speed should be at point of entry into intersection.

LANE CHANGING

1. Emphasize checking mirrors, blind spots, and traffic.
2. Do not oversteer.
3. Signal your intentions to other drivers.
4. Head check should be a glance, not a prolonged look.

PASSING - TWO-LANE ROAD

1. Check for safe passing distance.
2. Close gap no less than half of the safe following distance.
3. Be sure to give the proper signal (this may include the horn).
4. Avoid sudden changes in direction or speed.
5. Maintain a passing speed until you have returned to the proper lane.
6. Signal for a right turn as you pass.
7. Before you return to the right lane, be sure you can see the front of the car just passed in the rear view mirror.
8. Hand cancel signal if necessary.
9. Avoid excessive speed while passing.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

TEACHING POINTS

"Y" TURNS

1. Give proper signal for stopping.
2. Come to a complete stop before turning.
3. Emphasize checking blind spot before turning left.
4. When turning wheel, use hand-over-hand steering technique.
5. When wheels are fully turned, do not continue to turn steering wheel.
6. Be careful not to hit the curb.
7. Make traffic check before each change of direction.
8. Emphasize proper backing procedures.
9. Do not turn the steering wheel unless the car is moving.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

TEACHING POINTS

PARKING ON AN UPGRADE WITH A CURB

1. If lane change is required, follow the proper lane change procedures. (1)
2. Use proper stopping techniques. (2)
3. If tire is against curb, move forward slightly to relieve pressure. (3)
4. Do not dry turn. (6)
5. Before leaving, pull forward to straighten wheels before entering traffic.
6. When leaving, follow proper lane change procedures. (6)

PARKING ON A DOWNGRADE WITH A CURB

1. If lane change is required, follow the correct lane change procedures. (1)
2. Use proper stopping techniques. (2)
3. If tire is against curb, move backward slightly to relieve pressure. (3)
4. Do not dry turn. (5)
5. Before leaving, back up slightly and straighten wheels to clear the curb.
6. When leaving, follow proper lane change procedures. (5)

PARKING ON A GRADE WITHOUT A CURB

1. If lane change is required, follow the correct lane change procedures. (1)
2. Use proper stopping techniques. (2)
3. Do not dry turn. (5)
4. Before leaving, straighten wheels in the parking space.
5. When leaving, follow proper lane change procedures. (5)

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

TEACHING POINTS

ANGLE PARKING (Right Side of Street)

1. If lane change is required, follow the correct lane change procedures. (2)
2. "Inside" refers to that part of the lane which is closest to the center line. (3)
3. Check left front and right rear for clearance while entering parking stall.
4. If tire is against curb, move backward slightly to relieve pressure. (6)
5. Avoid scraping the front bumper on a high curb.

PERPENDICULAR PARKING (Right Side of Street)

1. If lane change is required, follow the correct lane change procedures. (2)
2. Be careful not to interfere with traffic when making turn.
3. Check left front and right rear for clearance while entering parking stall. (5)
4. If the front tires are against the curb, move backward slightly to relieve pressure. (6)

TO LEAVE ANGLE PARKING SPACE

1. Use proper starting procedure and place selector lever reverse.
2. While backing, frequently check left front and right rear fenders for adequate clearance from parked cars. (2)
3. Do not cross lane line.
4. Use proper backing procedures.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

TEACHING POINTS

LEAVING THE CAR

1. Make sure your hand brake is set.
2. Make sure your selector lever is in "park."
3. Turn off lights.
4. If parked on a hill, make sure wheels are properly turned.
5. Exit car on street side only when it is safe to do so.

8-5

APPENDIX B

Laboratory Lesson Sequence

Lesson Plans

- Classroom
- Drivocator (Film Titles)
- Simulator
- Range
- On-Street

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

LABORATORY LESSON SEQUENCE

Type of Driving	Four-Phase Program (A)	Standard Program (B)	Simulator Program (C)	Range Program (C)
Residential	S-1(A),S-2(A),R-1, A-1,R-2,S-3(A),A-2	B-1,B-2,B-3,B-4	S-1(C),C-1,S-2(C), C-2	R-1,R-2,C-1,C-2
Light City	S-4(A),R-3,A-3	B-5,B-6	S-4(C),S-5(C),C-4	R-3,C-3,C-4
Highway	S-5(A),R-4,A-4	B-7,B-8,B-9,B-10, B-11,B-12	S-6(C),S-7(C),C-5, C-6	R-4,C-5,C-6
Heavy City	S-6(A),R-5,A-5	B-13,B-14	S-8(C),S-9(C),C-7	R-5,C-7
Expressway	S-7(A),R-6,R-7,A-6	B-15,B-16,B-17	S-10(C),S-11(C), C-8	R-6,R-7,C-8
Review	S-8(A),R-8	B-18	S-12(C),C-9	R-8,C-9

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

UNIT V - HIGHWAY DRIVING

ASSIGNMENT: Text: Chapter 2 - Foresight, pp. 29-31
Chapter 6 - Control on Curves, pp. 81-84
Chapter 10 - Driving in the Country, pp. 136-154
Chapter 14 - Conditions that Mean Danger, pp. 198-201, 213-215

Drivocator: Forces of Nature II
Driving Emergencies

Films: "Broken Glass" - March 18-29
"Red Light Return" - March 23
"Fatal Meeting" - March 11-22

Road and trip maps

Time: Four or five class sessions

Projects: Planning a road trip (groups #16 and #19)
Tire changing (select students in groups #16 and #19)

I. Introduction:

A. Critical aspects of highway driving:

1. Illusion of security due to velocitization and highway hypnosis.

2. High speeds increase the severity of nature's laws:

a. Inertia (centrifugal force).

b. Force of impact.

3. Accidents are often serious.

B. Highway driving demands additional driving and perceptual skills.

II. Manipulative Skills Needed:

A. Steering:

1. Firm but not tight grip.

2. Effects of sudden action.

3. Keep centered in lane by aiming high.

B. Braking:

1. Light to medium on most occasions.

2. Use engine compression in overcoming momentum.

3. Apply steady pressure on downgrades.

4. Learn when not to brake - shadows, leaves on road, shoulders, etc.

5. Learn how to brake to dry surfaces and to test road surfaces.

C. Passing:

1. Control impatience; wait for safe distances and conditions.

2. Be able to judge safe passing distances.

3. Judge speed of on-coming cars.

4. Use proper passing procedure.

5. Proper action on being passed (what type of action, i.e., defensive driving, judging distance, passing courtesy, etc.).

D. Curves:

1. Judge sharpness and degree of curves by signs, banking, etc.

2. Reduce speed before entering.

3. Keep to inside of curve.

4. Slow down before entering curve and accelerate while in the curve.

E. Following:

1. Judge safe distances using time spacing - use "timed interval" two seconds method.

2. The problem of congested traffic.

3. Avoid problems such as getting hemmed in, staying in another car's blind spot, spacing between cars, etc.

F. Stopping:

1. Know stopping distance under all conditions.

2. Factors that affect stopping distance - weather, speed, tires, etc.

III. Defensive Driving:

A. Preparations prior to driving.

1. Check car, tires, gas, water, etc.

2. Importance of good physical, good mental, and good emotional condition.

3. Have first aid kit, fire extinguisher, flares, reflectors, etc.

4. Load car properly.

5. Know proper method for signaling - when car is disabled, arm signals, use of brakes when slowing down or someone is too close to the back of your car.

B. Knowing and being able to handle:

1. Tire blowouts.

2. Brake failures.

3. Wet brakes.

4. Running off edge of pavement.

5. Skids and slippery surfaces.

6. Common errors of other drivers.

7. Your own errors and physical limitations.

8. Hydroplaning - causes, effects, and conditions which produces hydroplaning.

IV. Perception for Highway Driving:

A. Identify potential hazards - look for hints or cues.

B. Interpret potential dangers - look for way out.

C. Early anticipation of changes in traffic pattern.

V. Special Conditions:

A. Railroad crossings.

B. Side roads and driveways (Washington State Safety Council - June 1966, pp. 213-215).

C. Night driving.

D. Detours and road repairing.

E. Trailering with safety (Washington State Safety Council - June 1966).

F. Hills, mountains, dry areas - stalling and overheating.

G. Stopping along the highway - emergency and rest.

H. Pedestrians and hitchhikers.

I. Animals - cattle and wild.

J. Clearances - low, narrow.

K. Snow tires, tire chains, etc. (when special weather conditions or area indicate their possible need).

VI. Unit Activities:

A. Planning a trip:

1. Reading maps (all groups).

a. Map legend - symbols and markings.

b. Locating towns - alphabetical listing and means of locating.

c. Roads and highways - markers, paved, etc.

2. Planning an itinerary (for groups #16 and #19 - other groups discuss need and things to be considered).

a. Best routes for shortest, fastest, scenic and places of interest.

b. Routes for good eating and good sleeping places.

c. Plan starts and stops - time of day, sustaining speeds, cities and towns, ferries, customs, etc.

d. Estimated expenses for trip.

B. Changing a tire:

1. Safety considerations.

2. Storage compartment for tire.

3. Take tire out of storage well.

4. Replace tire.

5. Need for having tire repaired or replaced immediately.

6. Prevent car from moving while tire is being changed.

7. Arrange for a car and demonstrate change of tire (have selected students in groups #16 and #19 demonstrate changing a tire).

VII. Traffic Engineering:

A. Roadway characteristics:

1. Paved.

2. Unpaved.

B. Traffic flow.

C. Hazardous conditions - paved and unpaved:

1. Blind intersections.

2. Animals.

3. Slow-moving vehicles.

4. Absence or visibility problems of signs.

5. Differences in car control and roadway traction.

6. Roadway repairs.

7. Speed too fast for conditions.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

DRIVOCATOR PROGRAM

Program Number	Title	Running Time	Questions
1	The Challenge of Traffic	23:20	13
2	Psychophysical Factors	25:00	23
3	Social Pressures	19:00	13
4	Attitudes and Emotions	28:10	16
5	Laws of Nature I	29:10	22
6	Laws of Nature II	29:43	21
7	Rules of the Road	30:55	26
8	Signs of Life	27:00	26
9	Getting Ready to Drive	31:30	26
10	Learning Basic Skills	35:40	23
11	Precise Maneuvers	29:00	20
12	City Driving	32:00	27
13	The Open Road	33:45	17
14	Defensive Driving	22:00	19
15	Driving Emergencies	24:15	20
16	Adverse Driving Conditions	32:00	18
17	The Responsible Driver	26:17	19
18	Missing Links	28:00	16
	TOTALS	507:40	365
		Hours 8:26	Aver. 20
		Aver. 28 min.	

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

SIMULATOR LESSON SEQUENCE

SIMULATOR PROGRAM

	Film Titles	Evaluation Checks
	"AETNA" (Groups 28, 30)	
1.	"You and the Drivotrainer System"	
2.	"A Drive in an Automatic Shift Car"	#1 - Residential
3.	"Backing Safely"	
4.	"Angle Parking and Turning Maneuvers"	
5.	"Blending in Traffic"	#2 - Light City
6.	"Perfect Passing"	
7.	"Safe Highway Driving"	#3 - Highway
8.	"ABC's of Parallel Parking"	
9.	"Traffic Strategy"	#4 - Heavy City
10.	"Expressway Excellence"	
11.	"Expressway Excellence"	#5 - Expressway
12.	"Road Check"	
	"ALLSTATE" (Groups 29, 31)	
1.	"Start of Good Driving"	
2.	"The Good Turn"	#1 - Residential
3.	"In Reverse"	
4.	"City Driving" "Parking" (angle parking sequence)	
5.	"City Driving"	#2 - Light City
6.	"Highway Driving"	
7.	"Highway Driving"	#3 - Highway
8.	"Parking"	
9.	"Advanced City Driving"	#4 - Heavy City
10.	"Expressways Are Different"	
11.	"Expressways Are Different"	#5 - Expressway
12.	"Let's Review"	

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

SIMULATOR LESSON SEQUENCE

FOUR-PHASE PROGRAM

	Film Titles	Evaluation Checks
	"AETNA" (Groups 20, 22)	
1.	"You and the Drivotrainer System"	
2.	"A Drive in an Automatic Shift Car"	#1 - Residential
3.	"Backing Safely"	
4.	Objective Sequence of "Angle Parking and Turning Maneuvers" "Blending in Traffic" (ck)	#2 - Light City
5.	"Perfect Passing" "Safe Highway Driving" (ck)	#3 - Highway
6.	"Traffic Strategy" (ck) "ABC's of Parallel Parking"	#4 - Heavy City
7.	"Expressway Excellence"	#5 - Expressway
8.	"Road Check"	
	"ALLSTATE" (Groups 21, 23)	
1.	"Start of Good Driving"	
2.	"The Good Turn"	#1 - Residential
3.	"In Reverse"	
4.	"City Driving"	#2 - Light City
5.	"Highway Driving"	#3 - Highway
6.	"Advanced City Driving" (ck) "Parking" (parallel parking sequence	#4 - Heavy City
7.	"Expressways are Different"	#5 - Expressway
8.	"Let's Review"	

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

OFF-STREET MULTIPLE CAR DRIVING RANGE LESSONS

LESSON I

A. Pre-ignition procedure

B. Starting the engine

C. Putting car in motion

D. Stopping and securing procedure

E. Steering procedure

F. Backing procedure

G. Driving forward and backward

H. Left turns

I. Driving around area - counter clockwise

J. Lane change

K. Right turn

L. Driving around area - clockwise

M. Two-way traffic

LESSON II

A. Review of Lesson I

B. Right and left turns

C. Lane change (four-lane street)

D. Backing drill

E. "T" exercise

F. "X" exercise

G. Traffic signal

LESSON III

A. Review of Lesson II

B. Garage exercise

C. Angle parking - 60°

LESSON IV

A. Review of Lesson III

B. "Y" exercise

C. Angle parking - 90°

LESSON V

A. Review of Lesson IV

B. Passing

LESSON VI

A. Review of Lesson V

B. Parking on an upgrade with a curb

C. Parking on a downgrade with a curb

D. Parallel parking

LESSON VII

A. Review of Lesson VI

B. Expressway entrance

C. Expressway exit

LESSON VIII

A. Review of all past exercises

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

ON-STREET LESSONS

Lesson	Standard Program	Evaluation Check
B-1	Trip #1 - Starting to Drive (area adjacent to school)	
B-2	Trip #2 - Residential Driving (turns)	
B-3	Trip #2 - Residential Driving (turns)	
B-4	Trip #3 - Residential Driving (lane changing and use of one-way streets)	#1
B-5	Trip #4 - Light City Driving #1	
B-6	Trip #5 - Light City Driving #2	#2
B-7	Trip #6 - Rural Driving (county, secondary state roads and highways)	
B-8	Trip #6 - Rural Driving (county, secondary state roads and highways)	
B-9	Trip #7 - Highway Driving	
B-10	Trip #7 - Highway Driving	#3
B-11	Trip #8 - Trailer Trip #1	
B-12	Trip #8 - Trailer Trip #2	
B-13	Trip #9 - Heavy City Driving	
B-14	Trip #9 - Heavy City Driving	#4
B-15	Trip #10 - Driving on Hills	
B-16	Trip #11 - Expressway Driving #1	
B-17	Trip #11 - Expressway Driving #2	#5
B-18	Trip #12 - Review	

Lesson	Four-Phase Program	Evaluation Check
A-1	Trip #2 - Residential Driving (turns)	
A-2	Trip #3 - Residential Driving (lane changing and use of one-way streets)	#1
A-3	Trip #5 - Light City Driving #2	#2
A-4	Trip #8 - Trailer Trip	#3
A-5	Trip #9 - Heavy City Driving	#4
A-6	Trip #11 - Expressway Driving	#5

Lesson	Range or Simulator Program	Evaluation Check
C-1	Trip #2 - Residential Driving (Turns)	
C-2	Trip #3 - Residential Driving (lane changing and use of one-way streets)	
C-3	Trip #3 - Residential Driving (lane changing and use of one-way streets)	#1
C-4	Trip #5 - Light City Driving #2	#2
C-5	Trip #7 - Highway Driving	#3
C-6	Trip #8 - Trailer Trip	
C-7	Trip #9 - Heavy City Driving	#4
C-8	Trip #11 - Expressway Driving	#5
C-9	Trip #12 - Review	

Lesson B-1

TRIP #1 - STARTING TO DRIVE

(Area Adjacent to School)

I. Objectives:

A. To become familiar with the driver's compartment of a specific vehicle (gauges, controls, and safety devices).

B. To develop the ability to perform basic procedures involved in pre-ignition, starting, putting car in motion, steering, stopping, and securing the automobile.

C. To experience the feel of moving the automobile forward and backward.

II. Experiences:

A. General

1. Pre-entry checks.
2. Explain and discuss driving procedures: pre-ignition, starting, putting car in motion, steering (when moving forward and backward), stopping, and securing the automobile.
3. Hand-over-hand steering.
4. Procedures to follow when changing drivers.
5. Stop signs, stop lines, crosswalk (with sign), crosswalk (no sign).
6. Presence of other vehicles.
7. Left and right turns.
8. Backing from one-way to two-way.

B. Specific (may present hazard)

1. Entering Logan from student parking lot where visibility is often limited and traffic may be moderately dense.
2. Parked vehicles on narrow streets, and vehicles emerging from parking lots and business areas.

III. Route:

After having the students inspect conditions around vehicle for obstructions, condition of tires, etc., point out the gauges, controls, and safety devices on the automobile.

Leave school via the student parking lot. Turn left onto Logan and proceed north to Tobin. Turn left onto Tobin and proceed to Shattuck. Use the bus loading area, Tobin, Lake, Tillicum and Shattuck as a practice area.

Return to the school via Tobin, Logan and the east student parking lot.

Lesson A-1, B-2, B-3, C-1

TRIP #2 - RESIDENTIAL DRIVING

(Turns)

I. Objectives:

- A. To gain experience driving in light traffic.
- B. To increase skill in the hand-over-hand technique of steering.
- C. To practice making left and right turns.
- D. To become aware of traffic conflicts and how to make adjustments necessary to cope with such conflicts.
- E. To develop the ability to make decisions relative to right-of-way, primarily at uncontrolled intersections.
- F. To learn procedure for making a proper lane change.
- G. To learn the proper way to stack for a left turn in an area between two one-way streets at an intersection.
- H. To learn how and why you should check traffic in both directions at intersections.

II. Experiences:

- A. General
  1. Entering one-way street from private driveway.
  2. Primarily residential streets with both controlled and uncontrolled intersections.
- B. Specific
  1. Left turn from one-way street onto two-way street using "stack" area as necessary (2nd onto Morris, Whitworth or Shattuck).
  2. Uncontrolled and blind intersections in South Renton area.
  3. Right turn on red situation (potential) at 7th and Rainier.

III. Route:

Leave school via south driveway turning right onto 2nd. Proceed on 2nd and turn left onto Morris, Whitworth, or Shattuck and proceed south to 4th. Turn left onto 4th and proceed to Burnett. Turn right onto Burnett. Move to the west side of the railroad tracks dividing Burnett.

Practice in the area: Burnett on the east, 7th on the south, Shattuck on the west, and Houser Way on the north.

Return to school via 7th to Rainier, Rainier north to Tobin, Tobin east to Logan, Logan to the east student parking lot, and return to the circular drive next to the portables.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

Lesson A-2, B-4, C-2, C-3
Evaluation Check #1 on
Lesson A-2, B-4, C-3

TRIP #3 - RESIDENTIAL DRIVING

(Lane Changing and Use of One-Way Streets)

I. Objectives:

A. To develop correct habits in making lane changes - proper lane change procedure.

B. To increase skill in making left and right turns.

C. To become familiar with one-way streets and the necessity for being aware of traffic flow designations (signs).

D. To expand the use of the eyes in driving to include observation of traffic signs, signals and lane markings.

E. To increase decision making ability at points of traffic conflict.

F. To gain experience of driving in close proximity with both parked and moving vehicles.

G. To gain proficiency in checking traffic in both directions at intersections.

II. Experiences:

A. General

1. Turns from two-way streets onto one-way streets.

2. Turns from one-way streets onto two-way streets.

3. Observation of signs, lane markings, and traffic patterns to assist in determining one-way and two-way streets.

4. Stop streets having no marking other than sign; having sign and crosswalk markings; and having sign, crosswalk, and designated stop line.

5. Left turns from one-way onto two-way streets and the need for proper positioning to stay right of center in turning and entering two-way street.

B. Specific

1. Entering Logan from student parking lot where visibility is often limited and traffic may be moderately dense.
2. Driving on Wells (one-way north) where lanes are quite narrow and there are cars parked at the curb.
3. Turns to and from 1st Street that are sharper than normal 90 degree turns.
4. Crossing 4th or Park (arterials) where traffic may be moderately dense at various times.

III. Route:

Leave school via student parking lot on Logan Avenue. Turn left from student lot onto Logan and proceed north to Airport Way. Continue north on Airport Way to 4th Street. Turn right onto 4th and use North Renton area within the confines of Burnett on the west, 6th on the north, Garden and Factory on the east, and 2nd on the south.

Return to school by either reversing the above route to the North Renton area or by driving south on Williams to Tobin, right on Tobin to Burnett, left on Burnett to 2nd, and right on 2nd to the southeast school driveway.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

Lesson B-5

TRIP #4 - LIGHT CITY DRIVING #1

I. Objectives:

A. To gain experience driving in light traffic on arterials as opposed to driving primarily in residential areas.

B. To gain experience driving in light city traffic prior to heavy city traffic.

C. To experience normal traffic movement and conflicts encountered in light city traffic.

D. To learn how to recognize and react safely to the different types of traffic situations encountered in light city traffic.

E. To learn the proper use of signal lights and channelized intersections.

F. To learn how to properly maneuver an intersection with more than four points of entry.

II. Experiences:

A. General

1. Turns and lane changes on one-way and two-way streets.

2. Driving on multiple and single lane streets.

3. Permissible right turns on "red."

B. Specific

1. Two lane oblique right movement from Park onto Bronson where lanes are narrow and lane markings are poorly delineated.

2. Left turn from Bronson onto Main complicated by junction of 2nd which is two-way east of Main and one-way west of Main.

3. Intersection of Main, 3rd and Houser Way with double set of traffic control signals, and somewhat unusual traffic pattern.

4. Multiple lane right turn situation from Williams onto Grady Way.

5. Potential bunching of vehicles at intersection of Rainier Avenue, Sunset Boulevard West and 3rd Street, and the resultant potential of being trapped in intersection when light changes.

6. Permissible right turn onto Rainier Avenue from Bronson Way.

III. Route:

Leave school yard via east student parking lot. Turn left onto Logan. Proceed north on Logan to Airport Way. Continue on Airport Way to 4th. Turn right and travel east on 4th to Park and turn right. Travel south on Park to Bronson Way. Turn right onto Bronson Way and continue to Main. Turn left onto Main. Proceed south on Main to either 4th or 5th, turn right and work on left and right turns in the area: Main on the east, Grady Way on the south, Burnett on the west, and 4th on the north.

A suggested work pattern is as follows: Turn right from Main onto 5th. Proceed to Burnett and turn right. Travel on Burnett to 4th. Turn right and drive to Williams, turn right. Go south on Williams (one-way) to 5th and turn left. Go east on 5th to Wells and turn left. Go north on Wells (one-way) to 4th and turn right. Go east on 4th to Main and turn right. Travel on Main staying to the right to enter Grady Way. Turn right from Grady Way onto Wells (one-way north). Go north on Wells to 5th or 4th. Turn left and proceed to stop sign on Williams.

Return trip: Turn left onto Williams and proceed south to Grady Way. Turn right and travel west on Grady Way to Rainier Avenue. Turn right and travel north on Rainier to Airport Way. Turn right and travel east on Airport Way to Shattuck. Turn right and go to Tobin. Turn left and stop between Shattuck and Logan to change drivers. Repeat the tour and return to the school via the student parking lot.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

Lesson A-3, B-6, C-4
Evaluation Check #2 on
Lesson A-3, B-6, C-4

TRIP #5 - LIGHT CITY DRIVING #2

I. Objectives:

A. To gain experience driving in light traffic on arterials as opposed to driving primarily in residential areas.

B. To gain experience driving in light city traffic prior to heavy city traffic.

C. To experience normal traffic movement and conflicts encountered in light city traffic.

D. To learn how to recognize and react safely to the different types of traffic situations encountered in light city traffic.

E. To learn the proper use of signal lights and channelized intersections.

F. To learn how to properly manuever an intersection with more than four points of entry.

II. Experiences:

A. General

1. Turns and lane changes on one-way and two-way streets.

2. Driving on multiple and single lane streets.

3. Permissible right turns on "red."

B. Specific

1. Two lane oblique right movement from Park onto Bronson where lanes are narrow and lane markings are poorly delineated.

2. Left turn from Bronson onto Main complicated by junction of 2nd which is two-way east of Main and one-way west of Main.

3. Intersection of Main, 3rd and Houser Way with double set of traffic control signals, and somewhat unusual traffic pattern.

4. Multiple lane right turn situation from Williams onto Grady Way.

5. Potential bunching of vehicles at intersection of Rainier Avenue, Sunset Boulevard West and 3rd Street, and the resultant potential of being trapped in intersection when light changes.

6. Permissible right turn onto Rainier Avenue from Bronson Way.

III. Route:

Leave school via east student parking lot. Turn right onto Logan and proceed south to 3rd. Turn left onto 3rd and proceed east to Main. Turn right onto Main and proceed south to either 4th or 5th. Turn right and work on left and right turns in the area: Main on the east, Grady Way on the south, Burnett on the west, and 4th on the north.

A suggested work pattern is as follows: Turn right from Main onto 5th. Proceed to Burnett and turn right. Travel on Burnett to 4th. Turn right and drive to Williams and turn right. Go south on Williams (one-way) to 5th, turn left. Go east on 5th to Wells and turn left. Go north on Wells (one-way) to 4th and turn right. Go east on 4th to Main and turn right. Travel on Main staying to the right to enter Grady Way. Turn right from Grady Way onto Wells (one-way north). Go north on Wells to 5th or 4th. Turn left and proceed to stop sign on Williams.

Return trip: Turn left onto Williams and proceed to Grady Way. Turn right and proceed west on Grady Way to Rainier Avenue. Turn right and proceed north to Tobin Street. Turn right and travel east on Tobin. Stop between Shattuck and Logan to change drivers. Repeat the trip by turning right onto Logan and proceed south to 3rd, etc.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

Lesson B-7, B-8

TRIP #6 - RURAL DRIVING

(County, Secondary State Roads, and Highways)

I. Objectives:

- A. To gain experience in driving at increased speeds.
- B. To develop the ability to perceive traffic and road conditions on a rural road and properly adjust to such conditions.
- C. To develop judgment relative to speed control prior to entering curves, and in traveling winding roads.
- D. Experiencing visibility problems on rural roads.

II. Experiences:

- A. General
    1. Highway driving in speed zones up to 50 mph.
    2. Proper speed control on curves and winding roads.
    3. Possible encounters with small animals on the road and/or farm animals or machinery.
    4. Identification of traffic signs and correct response to situations indicated by the signs.
    5. Experience with various road surfaces - asphalt, concrete, gravel, dirt, etc.
    6. Light city traffic driving within Renton city limits.
    7. Meeting and overtaking traffic generally found on county and secondary roads.
- B. Specific
    1. Curves (some sharp) and winding roads over entire route.
    2. Narrow, curving bridge over Issaquah Creek.
    3. Blind side road on the right entering Issaquah-Coalfield Road (1/4 mile west of junction of Issaquah-Coalfield Road and Issaquah-Hobart Road).

4. Poor visibility situation at stop sign prior to entering Issaquah-Hobart Road.

5. Blind side road on right where roadway from High Valley Estates enters Issaquah-Coalfield Road.

6. Poor visibility situation at stop sign prior to entering Renton-Issaquah Road.

III. Route:

Leave school via east student parking lot. Turn left onto Logan and continue to 4th. Turn right onto 4th and continue to 3rd Place. Turn right onto 3rd Place and proceed to Sunset. Turn right onto Sunset and proceed to Maple Valley Highway #169. Turn left onto Maple Valley Highway and proceed to Jones Road. Turn left onto S. E. Jones Road and go to first paved street on the left. Turn left at paved street and proceed up the hill to the Conservative Baptist Church of Renton on 156th Street, S. E. Change drivers.

Continue on 156th Street, S. E., to S. E. 128th Street. Turn right on S. E. 128th Street. Continue on S. E. 128th Street to 196th Place, S. E. Turn left onto 196th Place, S. E., and proceed to Coalfield Road. Turn left onto Coalfield Road and change drivers at first safe place. Continue on Coalfield Road to Sunset. Turn left onto Sunset and return to high school.

Lesson B-9, B-10, C-5
Evaluation Check #3 on
Lesson B-10 and C-5

TRIP #7 - HIGHWAY DRIVING

I. Objectives:

A. To gain experience driving on open highways at maximum legal speed limits.

B. To develop ability to control a vehicle and adjust to an open highway traffic environment.

C. To develop judgment in adjusting following distances at higher speeds.

II. Experiences:

A. General

1. Driving on two lane highways with unlimited access in speed zones up to 60 mph.

2. Overtaking and passing slower moving vehicles.

3. Perception of real and potential hazards in the form of approaching vehicles and vehicles on access or crossroads.

4. Observation of and reaction to traffic signs.

B. Specific

1. Sixty mph zone with curves calling for reduced speeds.

2. Highway markings and no passing zones that are often difficult to distinguish, particularly on rainy days.

III. Route:

Leave school via student parking lot. Turn left onto Logan and proceed to Airport Way. Turn left onto Airport Way and proceed to Rainier. Turn left onto Rainier and go south to the East Valley Highway (Washington #167). Proceed south on Washington #167 to 180th Street exit. Turn right at exit onto old East Valley Highway. Proceed to 180th S. (first stop sign). Turn right onto 180th S. and proceed to the West Valley Highway. Turn left onto West Valley Highway and change drivers at first safe place.

Proceed south on West Valley Highway to one block beyond Meeker Street (in Kent). Turn left onto approach to Washington #167 N. (East Valley Highway). Proceed north to 180th Street exit. Turn right onto 180th Street and change drivers at first safe place.

Proceed on 180th Street exit to Benson Highway. Turn left onto Benson Highway and follow Benson Highway to Main. Proceed on Main to 2nd Avenue. Turn left onto 2nd Avenue and return to school.

Lesson B-11, C-6

TRIP #8 - TRAILER TRIP #1

I. Objectives:

A. To gain experience in pulling and backing a trailer.

B. To develop ability to control a vehicle and trailer in a traffic environment.

C. To develop judgment in adjusting following distances when pulling a trailer.

II. Experiences:

A. General

1. Driving in traffic while pulling a trailer.
2. Increased braking distance needed when pulling a trailer.
3. Wider turning radii.
4. Backing trailer in a straight line.
5. Making a change of direction while backing a trailer.
6. Decreased visibility while backing a trailer.

B. Specific

1. Left turn at intersection with limited visibility.
2. Crossing a railroad track while pulling a trailer.
3. Steep hill, up and down.

III. Route:

Leave school via student parking lot. Turn left onto Logan and proceed to 4th Avenue. Turn right onto 4th and proceed to the driving range. The first driver goes through backing procedure. Change drivers.

Second driver goes through backing procedure. After completing backing procedure, second driver turns left onto "M" Street and proceeds to 7th Avenue. Turn left onto 7th Avenue and proceed to

"K" Street. Turn right onto "K" Street and proceed to 10th Avenue. Turn left onto 10th Avenue and proceed to Sunset. Turn right onto Sunset and proceed to 12th. Turn right onto 12th and proceed to "M" Street. Turn right onto "M" Street and proceed to range. Change drivers.

(If backing stalls are occupied, change drivers at range and second driver will run his route prior to backing.) Third driver goes through backing procedure, and returns to school.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

Lesson A-4, B-12
Evaluation Check #3 on
Lesson A-4

TRIP #8 - TRAILER TRIP #2

I. Objectives:

A. To gain experience in pulling a trailer at highway speeds.

B. To gain experience in backing a trailer.

C. To develop ability to control a vehicle and trailer on an open highway traffic environment.

D. To develop judgment in adjusting following distances when pulling a trailer.

II. Experiences:

A. General

1. Driving on two lane highways with unlimited access and pulling trailer at highway speeds.

2. Increased braking distance.

3. Wider turning radii.

4. Backing trailer in a straight line.

5. Decreased visibility behind automobile.

B. Specific

1. Left turn at intersection with limited visibility.

2. Winding roads.

3. Steep hill.

III. Route:

Leave school via student parking lot. Turn left onto Logan and proceed to Airport Way. Turn left onto Airport Way and proceed to Rainier. Turn left onto Rainier and go south to the East Valley Highway (Washington #167). Proceed south on Washington #167 to 180th Street exit. Turn right at exit onto old East Valley Highway. Proceed to 180th S. (first stop sign). Turn right onto 180th S. and proceed to the Orillia School.

The first change of drivers and backing will be done at the Orillia School. Two cars will back on the east side of the school and three cars will back on the west side of the school. After all students have practiced backing, proceed to the West Valley Highway.

Turn left onto West Valley Highway and proceed south to James Street. Turn left on James and proceed to the Benson Highway. Turn left onto Benson Highway and change drivers at first safe place and proceed on the Benson Highway to Main. Proceed on Main to 2nd Avenue. Turn left onto 2nd Avenue and return to school.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

Lesson A-5, B-13, B-14, C-7
Evaluation Check #4 on
Lesson A-5, B-14, C-7

TRIP #9 - HEAVY CITY DRIVING

I. Objectives:

A. To gain experience in driving in high density vehicle and pedestrian traffic.

B. To increase perceptual skills related to recognition of traffic hazards and conflicts encountered in heavy traffic.

C. Reinforce procedure of making left and right turns against a red signal light on both one-way and two-way streets.

D. To gain experience in angle and parallel parking.

II. Experiences:

A. General

1. Left and right turns from one-way to one-way, one-way to two-way, two-way to one-way, and two-way to two-way streets in proximity with heavy vehicle and pedestrian traffic.

2. Encountering traffic conflicts and hazards such as parked cars with occupants, pedestrian movement, traffic controls, and unusual intersections with and without adequate traffic controls.

3. Corner mounted signs, overhead signs, and street markings indicating lane usage and traffic patterns.

4. Left and right turns on red traffic signals.

B. Specific (All students should experience the following traffic situations.)

1. Intersection at corner of 5th and Main.

2. Turn right off of 3rd onto Main and right off of Main onto Houser.

3. Turn right off of Houser onto Burnett.

4. Use left turn lane onto Logan from 3rd St.

5. Angle parking
6. Parallel parking
7. One-way streets

III. Route:

Leave school via 2nd Street exit. Turn right onto 2nd. Proceed west to Morris or Whitworth. Turn left and proceed south to 3rd. Turn left onto 3rd and work in area between 2nd on the north, Main on the east, 5th on the south, and Burnett on the west between 3rd and 5th, and Morris on the west between 2nd and 3rd. Change drivers about every 15 or 20 minutes (divide the time equally). Try to make a change of drivers in a parallel or angle parking space.

Possible angle parking spaces: Covey's Parking Lot on Morris, 1st National Bank Parking Lot on Burnett, People's Bank Parking Lot on 2nd, and adjacent parking lot between Williams and Wells Streets.

Possible parallel parking area: Burnett, Williams, and Wells between 2nd and 5th; and 5th Street between Burnett and Wells.

Lesson B-15

TRIP #10 - DRIVING ON HILLS

I. Objectives:

A. To learn to control braking and acceleration in order to stop and restart smoothly on upgrades and downgrades.

B. Learn to park an automobile on upgrades and downgrades (with and without curbs).

C. To experience using the selector lever for a downshift to utilize engine friction and compression as an assist in speed control while descending steep or prolonged downgrades.

D. To learn proper procedure to follow when it is necessary to turn around on a dead-end street ("Y" turn).

II. Experiences:

A. General

1. Driving on steep upgrades and downgrades.

2. Parking on hills (with and without curbs).

3. The presence of numerous grade school children going to and from school during first and sixth periods of on-street work at the high school.

B. Specific

1. Driving on Houser Way which has railroad tracks primarily in the eastbound lane, and where occasionally a driver may meet a train proceeding west on Houser Way.

2. Corner of 3rd and Renton where cars descending the hill often are left of center in negotiating the turn.

3. Operating on Cedar (generally downgrade) which is narrow, usually has cars parked on both sides in places, and where upgrade traffic might be encountered.

4. Making a "Y" turn on the south end of Cedar or High Avenue.

III. Route:

Leave school via student parking lot. Turn right onto Logan and proceed to 3rd. Turn left onto 3rd and proceed to Burnett. Turn right onto Burnett and proceed to 4th. Turn left onto 4th and proceed to Houser Way. Turn left onto Houser Way and proceed to 3rd. Turn right onto 3rd and work in the Renton Hills area, within the boundaries of Mill on the west, High on the east, 3rd on the north, and 9th on the south. Divide time equally among students while in the hill area.

To return to school go west on 3rd to Mill. Turn right and proceed to 2nd. Turn left onto 2nd and return to school.

Lesson B-16

TRIP #11 - EXPRESSWAY DRIVING #1

I. Objectives:

A. To experience driving at freeway speeds.

B. To become aware of the modification in handling characteristics of a car traveling at 60-70 mph as opposed to 25 or 35 mph.

C. To further develop the quick glance technique in maintaining constant awareness of the complete traffic pattern.

D. To gain confidence in the ability to control a car at freeway speeds.

E. To practice the proper procedures for entering and exiting the freeway.

F. To become familiar with freeway signing and the need for prior planning and continuous alertness in order to make safe and efficient use of this type of roadway.

G. To gain experience in the use of acceleration and deceleration lanes, ramps, and blending in traffic.

II. Experiences:

A. General

1. Practice using cloverleaf and diamond-type freeway interchanges.

2. Driving at freeway speeds.

B. Specific

1. Weaving lane situation at Kent exit.

2. Suggested 50 mph curves in 70 mph zone in area where freeway passes over 3rd in the vicinity of downtown Renton.

3. Slow speed of merging vehicles (particularly trucks) at the several uphill entrance ramps and acceleration lanes passed.

4. Limited visibility situation following exit from #405 into Sunset (yield to traffic on Sunset).

III. Route:

Leave the school via the student parking lot. Turn left on Logan. Proceed to the Bronson Way entrance to Interstate #405 via 4th, 3rd Place, and Bronson Way. Enter Interstate #405 southbound at Bronson Way and proceed to the Kent-Auburn exit. Leave the expressway, go under the overpass, and re-enter Interstate #405 in the northbound lane.

Continue to the Bronson Way exit and exit onto the Maple Valley Road. Proceed to Sunset, turn right into Sunset, and change drivers at the Wigwam Store.

Re-enter Interstate #405 via the Bellevue entrance and proceed to the 94th Street exit. Leave the expressway on the diamond exit, and re-enter after you cross S. E. 94th Street, still in the northbound lane. Proceed to the S. E. 80th Street exit, turn left onto S. E. 80th Street, cross over the overpass, and turn left onto the southbound ramp to Interstate #405. Proceed south to the Renton exit via Sunset. Stop across the street from the Wigwam Store and change drivers for the second time.

Re-enter Interstate #405 in the southbound lane via the Bronson Way entrance. Proceed to the Kent-Auburn exit, leave the expressway, cross under the overpass, and re-enter the expressway in the northbound lane. Proceed to the Bronson Way exit, leave the expressway, and return to the school via Bronson Way and 2nd Street.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

Lesson A-6, B-17, C-8
Evaluation Check #5 on
Lesson A-6, B-17, C-8

TRIP #11 - EXPRESSWAY DRIVING #2

(Plus Parking, Stopping, and Starting on a Hill)

I. Objectives:

A. To experience driving at freeway speeds.

B. To become aware of the modification in handling characteristics of a car traveling at 60-70 mph as opposed to 25 or 35 mph.

C. To further develop the quick glance technique in maintaining constant awareness of the complete traffic pattern.

D. To gain confidence in the ability to control a car at freeway speeds.

E. To practice the proper procedure for entering and exiting the freeway.

F. To become familiar with freeway signing and the need for prior planning and continuous alertness in order to make safe and efficient use of this type of roadway.

G. To gain experience in the use of acceleration and deceleration lanes, ramps, and blending in traffic.

H. To experience parking, stopping, and starting on a hill (up and down).

II. Experiences:

A. General

1. Practice in using cloverleaf and diamond-type freeway interchanges.

2. Driving at freeway speeds.

B. Specific

1. Weaving lane situation at Kent exit.

2. Suggested 50 mph speed curves in 70 mph zone in area where freeway passes over 3rd in the vicinity of downtown Renton.

3. Slow speed of merging vehicles (particularly trucks) at the several uphill entrance ramps and acceleration lanes passed.

4. Limited visibility situation following exit from #405 into Sunset (yield to traffic on Sunset).

5. Practice up and down hill parking in the Monterey Terrace area.

III. Route:

Leave the school via the student parking lot. Turn left onto Logan and proceed to 4th Avenue. Turn right onto 4th Avenue and continue to 3rd Place. Turn right onto 3rd Place and go to Sunset. Turn right onto Sunset. Lane change twice to the left and position the car in the proper lane to enter Interstate #405 after you go through the light at Sunset and the Maple Valley Road intersection.

Enter #405 southbound and continue to the Kent-Auburn exit. Leave #405 via the Kent-Auburn exit and proceed under the overpass and re-enter Interstate #405 in the northbound lane. Continue to the Bronson Way exit where you exit onto the Maple Valley Highway. Turn right onto the Maple Valley Highway and go under the overpass to Sunset. Turn right onto Sunset and proceed to 4th Avenue. Turn right onto 4th Avenue and continue to Monterey Drive. Turn right onto Monterey Drive and work in the Monterey Terrace area on up-and-down hill parking.

Change drivers after the first student has had an opportunity to up-and-down hill park. Turn right onto Monterey Drive and proceed to 4th Avenue N. Turn left onto 4th Avenue N. and continue to Sunset. Turn right onto Sunset and proceed to the Bellevue entrance to Interstate #405. Turn left onto the Bellevue ramp and enter #405 northbound. Proceed to the S. E. 94th Street exit and leave the expressway via S. E. 94th Street. Turn left onto S. E. 94th Street and proceed over the overpass and re-enter #405 southbound. Continue to the North Renton exit.

Turn off #405 onto Sunset and proceed to 4th Avenue N. Turn left onto 4th Avenue N. and return to Monterey Terrace for up-and-down hill parking with students #2 and 3. Repeat the expressway route covered with Student #2. When you exit #405 onto Sunset, turn right on 4th Avenue N. and return to school.

If traffic in Monterey Terrace area is not too heavy, driver #2 can complete his parking procedures prior to going on his expressway trip.

Lesson B-18, C-9

TRIP #12 - REVIEW

I. Objectives:

A. To review previous lessons:

1. To determine driving skills that need improvement through practice.

2. To indicate driving procedures that have been mastered as to concept and performance.

B. To undergo an evaluation procedure designed to aid the student in improving skill and perception.

II. Experiences:

A. General

1. Light traffic

2. Freeway enter, travel, exit

3. Heavy traffic

4. Stop, restart, park on hills

5. Parallel parking between cars

B. Specific

1. Peculiar lane marking and arrangement on Sunset Boulevard approaching Bronson Way for approach to freeway entrance ramp.

2. Lane design at Rainier as a driver leaves freeway ramp and wishes to continue north on Rainier. Merge lane becomes free right turn lane in short distance from exit ramp to Grady Way.

3. Left turn from Williams onto Houser Way and the presence of parked cars on the right on Houser Way and railroad tracks up the middle of the street.

III. Route:

Leave school via the southeast driveway and turn right onto 2nd Street. Turn left onto Morris or Whitworth and proceed to 3rd Street. Turn left onto 3rd Street and lane change to the right lane as soon as possible. Continue on 3rd Street to Houser Way (be sure to enter the correct channel one block east of Main Street to get onto Houser Way). Follow Houser Way around to Bronson Way. Turn right onto Bronson Way, and turn right again onto the Bronson Way entrance ramp to Interstate #405 southbound.

Proceed on Interstate #405 south to the Rainier Avenue exit where you leave Interstate #405. Proceed on Rainier Avenue to 3rd Street and turn right onto 3rd. Continue on 3rd Street to Williams and turn right onto Williams. Continue on Williams to Houser Way and turn left onto Houser Way. Proceed on Houser Way to 3rd Street, turn right, and cross Mill Avenue. Do an uphill park with student #1 between Mill and Cedar, and change drivers.

Driver #2 leaves the uphill park, turns right on Cedar, and proceeds to 4th Street. Turn right on 4th Street, and proceed to Mill Avenue. Turn right on Mill Avenue, and continue to Houser Way. Turn right on Houser Way. Proceed to the Bronson Way entrance to Interstate #405 southbound. Repeat the portion of the route covered by student #1 from Interstate #405 to the uphill park between Mill and Cedar Avenues.

Change drivers again and have student #3 cover the same route as student #2 until you get to 3rd Street and Logan. At that point, turn left onto Logan and return to the school via the east student parking lot.

NOTE: If you miss the proper channel at Mill Avenue and Houser Way with student #1, turn left onto Mill Avenue and proceed to Bronson Way. Remain in the outside lane on Bronson Way to the entrance to Interstate #405 south.

APPENDIX C

Evaluation Instruments

Knowledge
Driving Performance
Traffic Analysis

THE CENTER FOR SAFETY
SCHOOL OF CONTINUING EDUCATION
NEW YORK UNIVERSITY

NATIONAL TEST IN DRIVER EDUCATION

(Special Form)

Fill in the following blank spaces, read the directions for answering the test questions, and then start immediately with the test. You have up to thirty (30) minutes, beginning now.

NAME________________________________ CITY______________ STATE__________

AGE________ SEX_____________ DATE_____________________________________

SCHOOLING (indicate grade level completed or nearly completed)__________

HAVE YOU HAD A DRIVER EDUCATION COURSE IN HIGH SCHOOL?__________________

HAVE YOU RECEIVED ANY DRIVING INSTRUCTION FROM:

Parents _________
Friends _________
Private school_________

DIRECTIONS:

Some of the following statements are generally true; others are false or inaccurate. Read each statement carefully. If you think it is TRUE, place an X on the blank line in the TRUE column. If you consider it FALSE, place an X on the blank line under FALSE. Please do not ask any questions regarding interpretation of any items.

EXAMPLE:	TRUE	FALSE
Drivers under 20 years of age have proportionately fewer accidents than those in their forties.	__________	X

		TRUE	FALSE
1.	Most skids are due to circumstances beyond the driver's control.	______	______
2.	On multi-lane highways, slow drivers should use the extreme right lane.	______	______
3.	Bicycles should be ridden on the left side of the roadway facing traffic.	______	______
4.	When a car's speed is doubled, its force of impact is four times as great.	______	______
5.	It is all right to cross the center line on a curve, provided you can see at least 400 feet ahead.	______	______
6.	If the right front tire blows out, apply brakes hard and steer to the left.	______	______
7.	When driving at night in a heavy fog, it is best to use the lower headlight beam.	______	______
8.	Studies show that alcohol is a factor in about 50 per cent of fatal accidents at night.	______	______
9.	When driving at 50 mph with a moderate curve ahead, it is best to apply the brakes before entering it.	______	______
10.	It is not necessary to signal when you wish to make a left turn if you see no car following you.	______	______
11.	A left turn at an intersection of multiple-lane streets should be made from the lane nearest the center line.	______	______
12.	Sunglasses are not recommended for night driving glare.	______	______
13.	If your car is forced off the road to the right on a soft shoulder, apply brakes hard and steer sharply to the left.	______	______
14.	Most accidents cannot be prevented because "chance" brings together the conditions for a collision.	______	______
15.	If a car starts to skid, gradually release the pressure on the accelerator.	______	______

		TRUE	FALSE
16.	More accidents are due to errors on the part of the driver rather than mechanical defects of the car.	______	______
17.	The "show-off" driver is one who lacks the skill necessary to handle a car.	______	______
18.	Because of greater traffic congestion, it is more hazardous to drive during the day than at night.	______	______
19.	When backing a car, you do not have the right of way even though you proceed slowly.	______	______
20.	Defective headlights contribute to more accidents than defective brakes.	______	______
21.	When it is necessary for pedestrians to walk on highways, they should always face the oncoming traffic.	______	______
22.	It is good practice for drivers to focus their eyes immediately in front of the car rather than on objects some distance ahead.	______	______
23.	Snow tires give less traction on ice than do chains.	______	______
24.	Pedestrians should be given the right of way even though they are crossing against the lights.	______	______
25.	A car approaching an intersection should yield the right of way to one that has already entered the intersection from a cross street.	______	______
26.	Liability insurance protects a driver against damage to his own car.	______	______
27.	The differential permits the rear wheels to turn at different speeds while the car goes around a corner.	______	______
28.	Orders by a policeman should be obeyed even if the orders are in conflict with an operating signal light.	______	______
29.	People with orthopedic disabilities, as a group, have established acceptable driving records.	______	______

	TRUE	FALSE
30. The steering system of most modern automobiles makes use of rods which move the front axle in various directions.	______	______
31. The presence of "bluish" smoke from an exhaust pipe is an indication that the level of oil in the cylinder head is low.	______	______
32. Diamond-shaped yellow signs with black letters warn of potential danger ahead.	______	______
33. Three times the number of fatal traffic accidents occur on rural highways as on urban streets.	______	______
34. Every motor vehicle should be safety inspected by a thorough, competent mechanic at least two times each year.	______	______
35. The basic purpose of driver licensing is the collection of revenue to build newer and better highways.	______	______
36. Visual acuity is a term used to identify the ability of a person to judge the relative distance between two or more objects.	______	______
37. If the accelerator sticks to the floor when driving a gearshift transmission car, the first move should be to push the clutch pedal down.	______	______
38. When overtaking and passing other vehicles on a limited access highway, it is permissible to exceed the posted speed limit while in the act of passing.	______	______
39. In case of a skid in which the rear of a car is moving to the driver's left, the steering wheel should be turned to the driver's left.	______	______
40. Since the parking brake has more holding power than the brake pedal, it should be used when a quick stop is necessary.	______	______
41. The ability to accelerate is less important than the ability to decelerate.	______	______
42. Lowering the height of cars improves cornering ability.	______	______

	TRUE	FALSE
43. A variation of one degree in headlight adjustment will cause the beam to be five feet out of line at a distance of 300 feet.		
44. Nothing can be done about emotions that may interfere with safe and efficient driving.		
45. About 25 feet are needed to stop a car from a speed of 25 mph.		
46. Establishment of minimum speed limits is an unfair invasion of human rights.		
47. When the foot brake fails, chances are that the parking brake has also failed.		
48. An emergency situation exists prior to every collision in traffic.		
49. Nondriver pedestrians are involved in proportionately more auto-pedestrian accidents than pedestrians who possess a driver's license.		
50. Although expressways have eliminated cross traffic and have separated opposing lanes of traffic, a lower accident rate has not yet been attained.		
51. Vehicle-actuated traffic signals are set to follow a fixed cycle.		
52. A flashing red light at an intersection means the same as a stop sign.		
53. Selective enforcement refers to the practice of careful selection of policemen for traffic duty.		
54. In case of a traffic accident, the limit of liability is the amount a court decides is adequate to compensate for damages.		
55. Statistics show that about one half of all accidents occur within 25 miles of drivers' homes.		
56. When leaving an expressway, there is no difficulty in adjusting to lower speed requirements on ordinary roadways.		

TRUE FALSE

57. Just before entering a two-way intersection, the driver should look first to the left and then to the right for cross traffic, regardless of whether he is going to make a left turn or a right turn. ______ ______

58. When parking downhill where there is no curb, the driver should have the front wheels of his car turned to the right. ______ ______

59. For most people, driving three hours in a single stretch presents no special difficulty. ______ ______

60. Tailgating another vehicle is all right if you know for a fact that you have quick reflexes. ______ ______

61. It is permissible to use another person's license if you have his authorization in writing. ______ ______

62. Begin your right or left turn signals at least 100 yards before making the turn. ______ ______

63. There is no excuse for ignorance of laws and regulations applying to each area in which a person may be driving. ______ ______

64. The function of the carburetor is to mix gasoline and air as fuel for the engine. ______ ______

*65. On a two-lane, two-way roadway, it is permissible to pass if there is a yellow line on your side of the roadway, parallel to the center line. ______ ______

*66. The law requires that a driver have his vehicle lights on a half hour after sunset. ______ ______

*67. It is permissible, but not desirable, for drivers to offer rides to hitchhikers. ______ ______

*68. Parking is prohibited within twenty feet of a crosswalk at an intersection. ______ ______

*69. A driver must stop when approaching a school bus with flashing red lights and a stop sign showing, unless his path around the bus is unobstructed. ______ ______

*70. Tire failure is a major cause of expressway accidents. ______ ______

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*Items applying particularly to the State of Washington

ITEM (Applicable Number of Trials Given in Parentheses)	Date of Road Test________________		SCORE	
			FAIR	BAD
1. Prior to Start (1)	seat, mirror, posture, doors MIRROR OR DOORS, ADJUST IN MOTION		3	6
2. Start, Pull Out (1)	neutral/park, start, handbrake, gear (MULTIPLE-SIGNAL, TRAFFIC CHECK) HANDBRAKE NOT RELEASED		5	10
3. Backing, 50 Feet (1)	10-15 mph, weave 1 foot, look over left shoulder MORE THAN 15 MPH, WEAVE MORE THAN ONE FOOT, USES MIRRORS ONLY		3	6
4. Turnabout (1) (30 ft. street)	(MULTIPLE) bump curb, turn wheel at stop, interferes with traffic (MULTIPLE) MORE THAN THREE TURNS, CLIMBS CURB, STARTS ON LEFT		3	6
5. Parallel Park (1)	(M) bumps anything, not centered, extra move within 6 in. of legal curb distance (M) CLIMBS CURB, KNOCKS POLE OVER, 2 ATTEMPTS, MORE THAN 6 in. OF LEGAL CURB DISTANCE. (M) MORE THAN 2 MIN.		3	6
6. Shifting Gears	wrong gear CHANGE, FORWARD-REVERSE IN MOTION		3	6
7. Use of Accelerator	races engine, jerky motion NO ACCELERATE OR DECELERATE WHEN NECESSARY		3	6
8. Park, Uphill (1)	(M) handbrake and/or gears not set, wheels not at proper angle, ignition not off (M) CAR ROLLS BACK, LEAVES CAR WITH FRONT WHEELS MORE THAN ONE FOOT FROM CURB		5	10
9. Start on Upgrade (1)	(M) rolls back 6 in., not in neut., left foot not on foot brake when releasing handbrake (M) ROLLS BACK MORE THAN 6 IN., STALLS, HANDBRAKE NOT RELEASED		3	6
10. Lane Observance	not centered in lane, uses wrong lane STRADDLES LANE (ONLY IF MARKED)		5	10
11. Intersection Observance Blind (1) Uncontrolled, Going Straight Through (2) Uncontrolled, Turning (2)	crowds into intersection to make left turn DOES NOT TURN HEAD TO CHECK TRAFFIC, NO TRAFFIC CHECK ON GREEN LIGHT, CROWDS INTERSECTION ON RED LIGHT (DO NOT SCORE STOP SIGNS HERE)		5	10
12. Intersection Speed	reduces speed 10 mph. or less REDUCES SPEED 5 MPH OR LESS, NO STOP AT UNCONTROLLED INTERSECTION, IF NECESSARY		5	10
13. Speed Control	driving 5-10 mph below limit, fails to decelerate in time, 5 mph over limit 10 MPH BELOW LIMIT, FAILS TO DECELERATE, TOO FAST FOR CONDITIONS		5	10
14. Following	¾ car length per 10 mph., stops too close to car in front LESS THAN ¾ CAR LENGTH PER 10 MPH, TOO CLOSE FOR CONDITIONS		5	10
15. Right of Way	(M) does not take it when granted RUSHES PEDESTRIANS, NO YIELD ON LEFT, SLOW TO HEED SIRENS, INTERFERES WITH TRAFFIC HAVING RIGHT OF WAY		5	10
16. Steering	no hand over hand, oversteers, understeers, weaves, elbow on window, hands not at 10-2, hand signals while turning ONE HAND DRIVING, CAR SWERVES, SPIN BACK UNCONTROLLED		5	10
17. Attention	does not follow directions (any instruction), irrelevant conversation, adjust seat, mirror, lights cigarette while driving (eyes not off road) TAKES EYES OFF ROAD TO TALK OR MAKE ANY ADJUSTMENT FOR MORE THAN 1 SECOND AT A TIME		5	10
18. Defensive Driving	not slow enough in congested areas, no horn when needed, no assistance given to an overtaking car NOT SLOW IN CONGESTED AREAS (PARKED CARS, PEDESTRIANS, ETC.) IMPROPER REACTION TO EMERGENCY SITUATIONS		5	10
19. Unfamiliar with Rules	blocks unmarked crosswalk unnecessarily BLOCKS MARKED CROSSWALK, USES HORN TO HARASS OTHERS, PARKS TOO CLOSE TO TRAFFIC SIGNS OR INTERSECTION OR FIRE HYDRANT		5	10
20. Use of Clutch (STANDARD TRANSMISSION ONLY)	"ride" clutch, "snaps" clutch up, clutch not with brake, clutch not fully down. STALLS DUE TO CLUTCH ACTION, COAST DOWN HILL OR AROUND TURN, "JERKY" ACTION OF CLUTCH.		5	10
21. Use of Footbrake	poor position of foot on pedal, jerky stops, no brake pump when needed, brakes in turn STOPS UNNECESSARILY, FOOT SLIPS OFF PEDAL, FOOT MISSES PEDAL, BRAKES TOO LATE		5	10
22. Use of Mirror	does not check periodically, fails to use when turning, not aware of overtaking car NO CHECK OF THE REAR, NO CHECK BEFORE LANE CHANGE, LOOKS TOO LONG (MORE THAN 2 SECONDS)		5	10
23. SLOW and Other Signs	(M) slows 5 mph or less for "Slow," "Yield," "R.R.," etc. signs NO SPEED DECREASE WHEN PASSING "SLOW" OR OTHER CAUTION SIGNS	First	1.0	2
		Second	1.0	2
		Third	1.0	2
24. STOP Signs	(M) stops on STOP line STOPS IN INTERSECTION ON FIRST STOP, FAILS TO MAKE SECOND STOP WHEN NECESSARY	First	2.5	5
		Second	2.5	5
25. Traffic Lights	enters intersection on amber light, fails to clear intersection on amber light, proceeds before light turns green, crowds intersection for left turn as light turns amber ENTERS INTERSECTION AFTER LIGHT TURNS AMBER (FROM MORE THAN 20 FEET BACK), CHANGES LANES IN INTERSECTION, PROCEEDS THROUGH INTERSECTION, CROWDS INTERSECTION FOR LEFT TURN AS LIGHT TURNS RED	First	2.5	5
		Second	2.5	5
26. Change Lanes	(M) changes lanes too soon after overtaking a car SLOWS OR CHANGES LANES TOO SOON CAUSING OVERTAKEN CAR TO SLOW, SHIFTS LANES UNNECESSARILY	First	2.5	5
		Second	2.5	5
27. Right Turns	(M) bumps curb lightly, enters lane 50-100 ft. prior to turn, 1 wheel in wrong lane (M) BUMPS CURB SHARPLY, ENTERS LANE WITHIN 50 FT. OF CORNER, WHEELS IN WRONG LANE, CROWDS OTHER CARS TO GET INTO LANE, ALLOWS ROOM FOR CARS TO PASS ON TURNING SIDE, HAS TO USE HARC BRAKE IN ORDER TO ENTER TURN, BOTH HANDS NOT ON WHEEL WHEN TURNING	First	1.5	3
		Second	1.5	3
		Third	1.5	3
28. Left Turns	(M) score as above for right turns	First	1.5	3
		Second	1.5	3
		Third	1.5	3

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

NAME ____
(Last) (First) (Middle)
ADDRESS ______________________________________ DATE ________________
(Street or Box Number)
CITY ______________________________ STATE ______________ ZIP CODE __________
CLASSROOM GROUP ____________ LAB GROUP ____________ STUDENT NUMBER ____________

"YOU ARE THE JURY"

Traffic Analysis Test

Traffic accidents do not just happen. They are caused by a series of events. The different parts of an accident are like the links of a chain. When all the links are connected, an accident occurs. If one of the links is missing or has been broken, the accident probably will not occur.

The purpose of this test is to see how well you can analyze the account of an accident and determine how it could have been prevented. Listen to each tape. Make notes if you wish beside the diagram of the accident. Then, answer these two questions in the space provided.

Question A: How could the accident have been prevented?

(Answer in essay form for each of the people involved in the accident. Make your answers as thorough as possible in the time alloted. If additional space is needed, continue on the back of the page.)

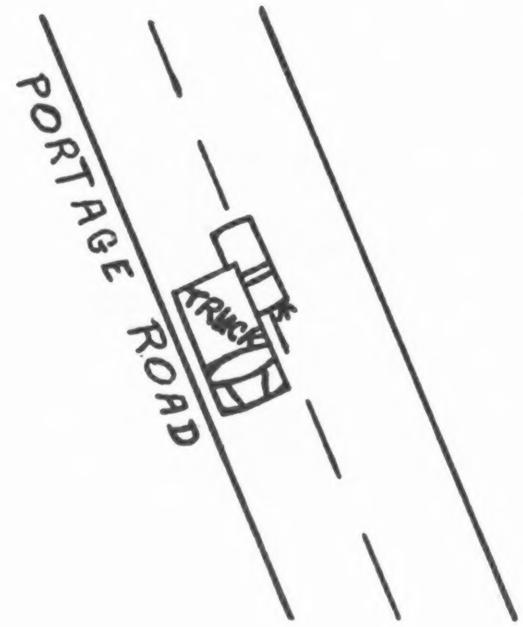
Question B: Who do you feel is primarily responsible for the cause of the accident?

You will have seven minutes to respond to each tape. At the end of five minutes, you will be informed that "you have two minutes left to work on this question." At the end of seven minutes, you will be told to "stop work on this question, and proceed to the next question."

Name ____________________

CASE OF THE MISSING LINKS

Notes



SITUATION: Outside of town on Portage Road, approximately 3:00 a.m.--not much traffic.

A. How could the accident have been prevented?

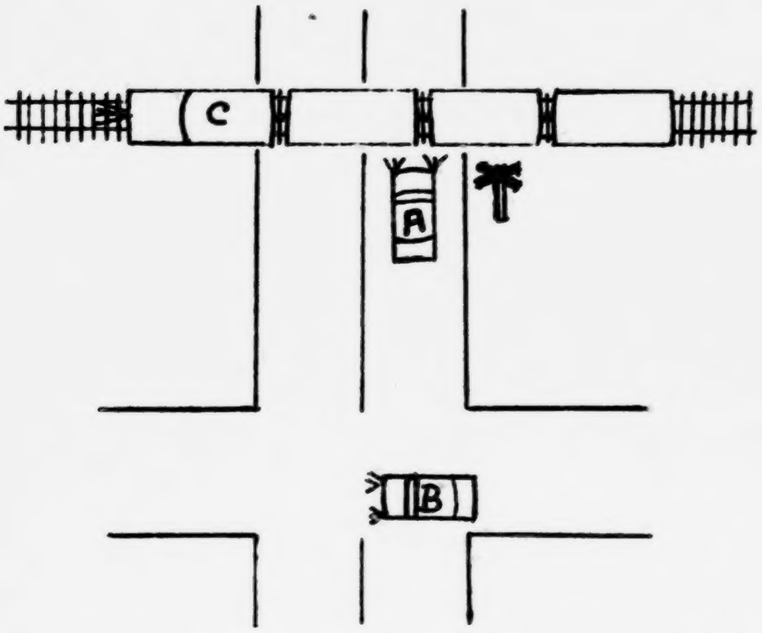
By Davis (truck driver)

By Anderson (automobile driver)

B. Who do you feel is primarily responsible for the cause of the accident?

Name ______________________________

CASE OF THE NIGHT FREIGHT



Notes

SITUATION: Good road--new blacktop, signs. Weather was clear and the road was dry. 10:30 p.m. Side road hidden by a clump of trees, about 350 feet from a railroad crossing.

A. How could the accident have been prevented?

By Grunell (driver of car "A")

____

____

____

____

____

By Byfield (driver of car "B")

____

____

____

____

____

By the train ("C")

____

____

____

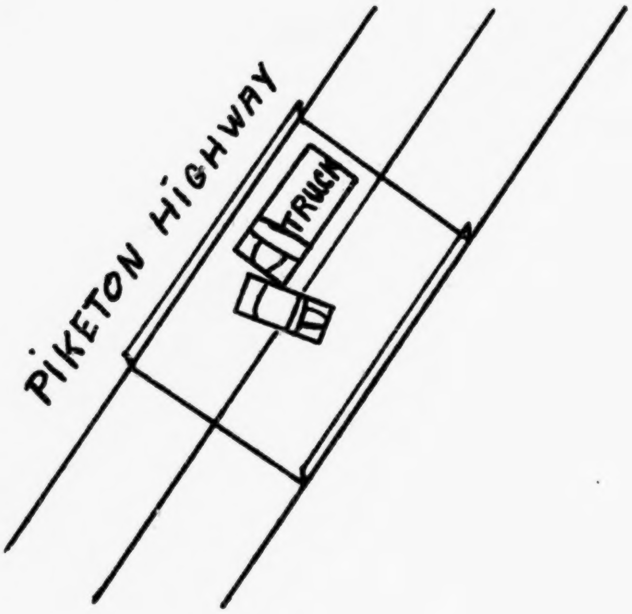
B. Who do you feel is primarily responsible for the cause of the accident?

____

b

CASE OF THE INVISIBLE ICE

Notes



SITUATION: Piketon Highway outside of town. It was a wet, cold morning. There was a thin skim of ice on the bridge.

A. How could the accident have been prevented?

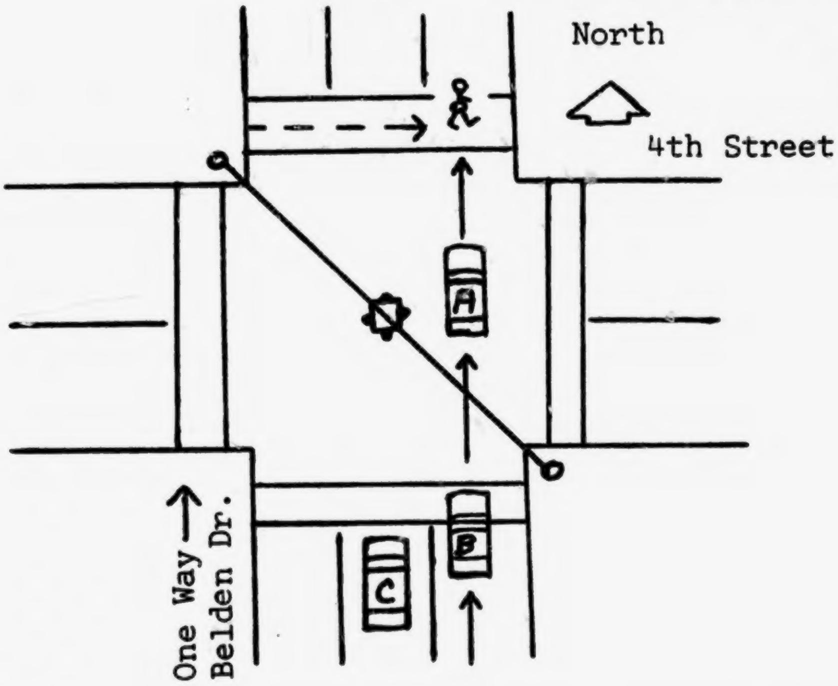
By Mrs. Vardar (automobile driver)

By Dan Menden (truck driver)

B. Who do you feel is primarily responsible for the cause of the accident?

Name

CASE OF THE BUSY INTERSECTION



Notes

SITUATION: Urban intersection with traffic signals. Belden Drive (north and south) is one way with thru traffic lanes. Fourth Street (east and west) is two way with one lane in each direction. Pavement--dry, weather--clear.

A. How could the accident have been prevented?

By Hudson (driver of car "A")

By Skoda (driver of car "B")

By Dover (Pedestrian)

B. Who do you feel is primarily responsible for the cause of the accident?

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

"YOU ARE THE JURY"

TRAFFIC ANALYSIS TEST

Instructions for Examiner

The following procedures should be followed when administering the "You Are the Jury" Traffic Analysis Test.

1. Have tape recorder ready for instructions.

2. Have transparency #1 on overhead projector and ready to turn on.

3. Give one "Test Booklet" to each student as they enter the room.

4. Instruct them to fill in the blanks on the first page. Print clearly. Give last name, first name, and middle name, in that order. Put your name at the top of each page as you turn to it.

5. Turn on tape recorder for test instructions. Ask students to follow instructions on the front page of the Test Booklet.

6. When the instructions are over, stop the tape recorder. Tell the students they will not be graded on spelling or grammar. Ask if there are any questions on the instructions. Also, ask if anyone had a problem hearing the tape. If they had trouble hearing, adjust volume and/or ask them to move closer to the speaker. Rewind a short portion of the instructions and play this to see if everyone can hear. Explain to the students that if anytime while the tape is playing they are not able to hear to understand the tape, they should quietly move closer to a speaker.

7. After all questions are answered say, "Turn to question #1 and listen to the tape."

8. Turn on tape recorder and listen to tape #1. Also turn on overhead projector.

9. At the end of tape #1 say, "You now have seven minutes to respond to tape #1."

10. Advance to tape #2.

11. At the end of five minutes say, "You have two minutes left to complete your answer."

12. At the end of seven minutes say, "Stop work on tape #1 and turn to question #2."

13. Change to transparency #2.

14. Turn on tape recorder and listen to tape #2.

15. At the end of tape #2 say, "You now have seven minutes to respond to tape #2."

16. Advance to tape #3.

17. At the end of five minutes say, "You have two minutes to complete your answer."

18. At the end of seven minutes say, "Stop work on tape #2 and turn to question #3."

19. Change to transparency #3.

20. Turn on tape recorder and listen to tape #3.

21. At the end of tape #3 say, "You now have seven minutes to respond to tape #3."

22. Advance to tape #4.

23. At the end of five minutes say, "You have two minutes to complete your answer."

24. At the end of seven minutes say, "Stop work on tape #3 and turn to question #4."

25. Change to transparency #4.

26. Turn on tape recorder and listen to tape #4.

27. At the end of tape #4 say, "You now have seven minutes to respond to tape #4."

28. Rewind tape to "Instructions."

29. At the end of five minutes say, "You have two minutes to complete your answer."

30. At the end of seven minutes say, "Stop work on tape #4. Make sure your name is on each page. Place your paper on the right side of your desk. Do not fold them. If the bell should ring before all test papers are collected, you are to remain in your seats until the test examiner dismisses you."

31. After all test papers have been collected and put in their folders, tell the students to remain quietly at their seats for the remainder of the period.

32. Do not discuss the test with the students.

33. Do not read the student bulletin 3rd period until after all test papers have been completed.

34. Have extra pencils for students who do not have pencils or who break the lead during the test and do not have an extra pencil.

CASE OF THE MISSING LINKS

MODERATOR: "The first I knew anything about the 'Case of the Missing Links' was through a couple of brief, unemotional paragraphs of a news report. It gave only the basic facts. A truck driven by Jim Davis broke down at night on a highway. Before Davis could get flares out, the disabled truck was hit from the rear by a car driven by a Mike Anderson. Anderson was injured. A passenger in his car was killed. But who was responsible? Well, a few more details were available from the reporter who covered the crash; and like most reporters, it wasn't hard to get him to talk about what he saw."

NEWS REPORTER: "My night editor got me out of bed about 3:25 that morning. Sent me out on Portage Road. That's where the crash occurred. Never will forget it. There was Anderson's car with its right side sliced off past the front seat. It was really jammed up under the bed of the trailer. It took them over an hour to pull the two apart and clean up. Firemen were flushing gasoline off the pavement."

MODERATOR: "Did you find out what happened?"

NEWS REPORTER: "I talked to Davis, the truck driver. Seems he and his relief driver missed the road to the Bayport Terminal. That meant five more miles around, and they were behind schedule. So Davis made a tight U-turn and headed back. It was outside of town on the highway, and there weren't any 'no U-turn' signs in the area. Anyway, that sharp turn broke the air hose to the trailer's brakes and the electric lines. David said he felt the trailer's brakes drag and then freeze. Well, that's what happens when the air line breaks. The truck couldn't be moved off the highway. So Davis was getting flares out of the cab when Anderson's car slammed into the left rear side of the trailer. Must have been quite an impact. I picked up a piece of broken windshield at least 120 feet from the wreck. And you know something?"

MODERATOR: "What's that?"

NEWS REPORTER: "Everytime I think about what I saw, I imagine I can hear that car crash into that trailer. Oh, that poor guy riding with Anderson never had a chance."

MODERATOR: "That's one account. The story of a series of small mishaps like links in a chain - a misturn, a late schedule, a few minutes of time, a broken air hose and an electric line. Each unimportant by itself, yet together they added up to death for one man, injury to another. What about the driver of the passenger car, Mike Anderson. What's his side of the story? It's harder - a lot harder - to get him to talk about what happened that night. But once he gets started, he seems to relive the events of that night with a kind of terrible intensity and without any prompting."

ANDERSON: "Bill Kronan and I were on our way home that night from a Regional Sales Meeting in Detroit. It was midnight before we could get started, but we wanted to be home for Thanksgiving. There wasn't much traffic on the highway, once we left the city, so I hit a steady pace pretty close to 55 mph. It was monotonous and we were tired. Anyway, I know that road like I know my own home street. It was exactly five minutes after 3:00 - Bill asked me the time - I just looked at my wrist watch. It has a luminous dial. When I glanced up at the road, it looked like a shadow ahead. Then I saw it was a truck. I saw its reflectors. I didn't realize at first the truck wasn't moving. When I saw it was stopped, I slammed on my brakes. I tried to turn out to the left, but we were just too close. We piled into the back end, the right side of my car slashed into the left end of the truck. Poor Bill must have been killed instantly. The door on my side must have wrenched off. I went right out after it, as least that's what I think happened. All I can remember is flying through the air. It seemed like a long time, and then I passed out, and I came to in the hospital with a concussion and a broken arm. Later they told me that Bill was dead. If that truck had only had some kind of a light on it, I'd have seen it in time to stop; but with no lights, I didn't have a chance."

MODERATOR: "Those are the facts in the 'Case of the Missing Links' - the collision that happened fast and the driver who didn't see the truck until it was too late. Anderson's car traveled more than 300 life saving feet before he realized the danger. Too late. Was this collision, were Bill Kronan's death and Mike Anderson's injuries, avoidable?"

CENTER ANALYSIS: "Center staff members place the most responsibility for today's crash on Anderson, driver of the passenger car. Anderson failed to take into account the limitations his headlight distance should have placed on his speed. He also failed to take into account his relaxed physical and mental condition. In short, Anderson was overdriving his headlights and his physical condition. It's true that the truck's U-turn made it a factor in the collision, yet there was no posted prohibition against U-turns in this area. Davis, the truck driver, displayed poor judgment, nothing more. It was Anderson who could have and should have avoided the collision. And yet by overdriving his headlights and his physical condition, he stacked the cards against himself, and here is why.

"At his speed of 55 mph, Anderson's car was traveling 80 feet a second. Now, most laws require headlights that will reveal persons or vehicles at least 350 feet ahead. Even if Anderson's headlights could pick up the truck 400 feet ahead, he had only 400 feet in which to stop. And yet Anderson admitted he realized the danger only after looking at his watch, saw an indistinct shape, identified what it was, and then realized it wasn't moving. All this time, his car was traveling ahead at 80 feet a second, covering at least 240 feet while he was becoming aware of the danger. Hitting the brake and bringing his car to a stop would require another 228 feet at 55 mph. And that adds up to

468 feet - 68 feet beyond the 400 feet his headlights gave him. Anderson couldn't stop in time. He should have recognized physical and headlight limitation and driven slower. He should have started braking the moment he saw something ahead without waiting to fully identify what it was and that it wasn't moving. Anderson is responsible. Despite observing the legal night speed limit and lighting requirement for his car, Anderson was driving too fast to stop within the reaction and stopping distance he needed to avoid a collision."

EVALUATION CRITERIA

CASE OF THE MISSING LINKS

Anderson (8)

1. He did not perceive the situation properly. (2)
2. Relaxed physical and mental condition. (2)
3. Failed to take into account the distance his headlights shone ahead. (2)
    - a. Looked at watch - took both eyes off road. (1)
    - b. Should have started braking the moment he saw dim object ahead. (1)

Davis (5)

1. Poor judgment. (2)
    - a. U-turn factor in collision. (1) (Overlap with #1)
    - b. Effect that it would have on his equipment. (1) (Overlap with #1)
    - c. He missed turn off. (1)
    - d. Behind schedule. (1)
    - e. Didn't send relief driver out to warn other traffic. (1) (Has to be specific about relief driver.)

CASE OF THE NIGHT FREIGHT

MODERATOR: "Mr. Grunell, how did it happen that you hit the train?"

GRUNELL: "Well you know, Rob, before this happened, I just couldn't understand how anyone could hit the side of a train."

MODERATOR: "Even at night?"

GRUNELL: "Yes, even at night. Unless they were racing down the road at 70 or 80."

MODERATOR: "Yet, you did hit a train. Were you driving 70 or 80?"

GRUNELL: "Not on your life. I had been driving at 55. But a lot of other things did happen, Rob. I think when the folks know what did happen, they'll see that circumstances were completely out of my control."

MODERATOR: "By that you mean, it wasn't your fault?"

GRUNELL: "That's right, I was trapped."

MODERATOR: "Well, give us your account. Let's see if our radio jury and studio panel members agree."

GRUNELL: "All right, you see, I am from Detroit. I had a meeting with out Nitesbridge sales representative the next day. And that's where I was headed. It was about 10:30 at night then."

MODERATOR: "Were you familiar with the road?"

GRUNELL: "I'd never been on it before. But it's a good road - new blacktop, signs - it's in good shape."

MODERATOR: "Now was the road dry that night?"

GRUNELL: "Bone dry. I'd come through all kinds of weather on the way up from Detroit - rain, melting snow, but where this happened, the weather was clear, and the road was dry."

MODERATOR: "What did happen then?"

GRUNELL: "Well, as I was coming up the road, I noticed a car approaching from my right on a side road. I could see his headlights. I kept watching his lights to see if he was going to stop. Well, sir, I saw those lights slow down. I didn't see any stop sign on my road, so I figured this other car had to stop. Then the lights disappeared behind a clump of trees. That was just before they reached the corner."

MODERATOR: "Did the car stop?"

GRUNELL: "Well, I didn't think so. Here's what happened. Just before I reached the intersection, those car lights came out from behind the trees. They seemed to be creeping out on the road in front of me. So I honked my horn and swerved to my left. Luckily there wasn't anything coming."

MODERATOR: "Then what?"

GRUNELL: "After that, things seemed to happen fast. After I passed, I glanced in the rear view mirror to see if that other car ever did stop. Sure enough it had. Then I looked ahead. Didn't see anything. Then I saw something moving across the road ahead of me. Next thing, I saw one of the cross buck signs they put at railroad crossings. I knew it was a freight train. I put on my brakes hard. I saw I wasn't going to be able to stop completely in time, so I let off my brakes and tried to swerve off to right. Didn't quite make it. Hit the train broadside doing about 10 mph. Spun me around and carried me into the ditch. Shook me up badly, but I guess I was lucky. You know, I had been planning on getting that car washed the next morning. After that train finished with it, it sure didn't need a wash job."

MODERATOR: "That's Grunell's account of the events that lead up to his car crashing into the side of the freight train. The driver of the car approaching on the side road was Cal Byfield. Perhaps he can answer some questions about this crash.

BYFIELD: "Be glad to Rob."

MODERATOR: "But first, why did you let your car creep toward the road."

BYFIELD: "Well, when you stop at that stop sign on the road I was on, that clump of evergreen trees Grunell mentions blocks your view. You have to pull almost up to the pavement to see down the road to your left."

MODERATOR: "So that is why your car was apparently moving."

BYFIELD: "That's right, but I was going to stop again, though."

MODERATOR: "Do you live in that area?"

BYFIELD: "Yes, about a mile back up the road I was on."

MODERATOR: "Well, maybe you can tell us then - why didn't Grunell see any flashers going at the crossings?"

BYFIELD: "That's simple, there aren't any."

MODERATOR: "Well then, what kind of warning is there?"

BYFIELD: "Well, about 50 feet past the intersection where I was, there is a round railroad crossing sign. That's about 300 feet from the crossing. Apparently Grunell never did see that. Then at the crossing there is that crossed-arm kind of sign, and I think they call it a cross-buck."

MODERATOR: "Did you know the accident had taken place?"

BYFIELD: "Oh sure, just as I started pulling across the road, I looked to my right. I saw that fellow's stop lights go on and then I saw him hit the train. Got down there as fast as I could to help. That car sure was a mess. Between the dirt that Grunell mentioned and what that train did to it, you couldn't tell it had been a late model car; but it was."

MODERATOR: "I have one other question. Grunell said he hit his brakes hard. Did you by any chance see the skid marks on the road?"

BYFIELD: "Yes, I was there when the investigating officer measured them."

MODERATOR: "How long were they?"

BYFIELD: "They started about 120 feet from the tracks. But like Grunell said, he let off on his brakes and tried to turn when he realized he couldn't skid to a stop."

MODERATOR: "Well, there are the facts. Was Grunell a victim of events immediately preceding the crash as he feels he is?"

CENTER ANALYSIS: "Center staff members feel that the basic cause of this collision is the most difficult to determine of any situation yet presented on 'You Are the Jury.' Now the panel's point concerning defensive driving and better warning devices at many now unprotected railroad crossings are valid suggestions. However, they do not hit at the basic cause of this collision, which is one most drivers forget. Grunell was not a victim of circumstances, but of a serious error he himself made.

"First, the intersection that Byfield's car was on was 350 feet from the railroad crossing. Now, according to minimum standards, the headlights should reveal persons or objects at 350 feet ahead. Yet when he looked ahead after passing Byfield's car, less than 350 feet from the tracks, Grunell did not immediately see the train. If he had, he could have stopped. Now this indicated that his headlights were not as effective as they should have been, and the final clue is in Grunell's own statement that he had driven through conditions that would throw mud and slush on his car. That his car, in fact, was dirty. What actually happened, was the dirt on the headlights had decreased their effectiveness. Grunell had not realized this. He did not slow down to compensate for this unexpected inability to see ahead as far as safety demanded. Few drivers, in fact, actually realize the extreme danger of dirty headlights.

"Grunell's experience illustrates what can happen while overdriving the distance you can actually see ahead. And this distance can vary greatly, according to the many outside conditions. Dirt on headlight lenses is only one of these. One reason for this failure is that windshield washers and wipers keep the windshield free of much of the dirt; therefore, the driver forgets completely about his headlight lenses. So when roads are wet, muddy, slushy, or snowy, make it a habit to keep your headlights clean for your own visibility, and clean your taillight lenses so that others can see you properly. Grunell could have stopped if headlights had been clean and revealed the train in time. Well, they did not, and his error in not keeping them clean makes Grunell responsible for this collision."

EVALUATION CRITERIA

CASE OF THE NIGHT FREIGHT

Grunell (7)

1. Grunell had driven through mud and slush prior to collision and did not take time to clean headlights. (2)
    a. Headlights were not as effective as they could have been. (1) (Overlap with #1)
    b. Defensive driving. (1) (Did not slow for intersection; assumed he had right-of-way, etc.)
    c. Did not see warning devices for railroad crossings. (1) (Either one or both signs)
    d. Did not immediately see train. (1)
    e. Overdriving distance that he could see ahead. (1)
    f. Diverted his attention to check the rear view mirror. (1)

Byfield (1)

a. His action when approaching the intersection. Had to stay stopped or should not creep into intersection. (1)

Train (1)

a. Need better warning device at railroad crossings. (1)

CASE OF THE INVISIBLE ICE

MODERATOR: "Mrs. Vardar, would you mind telling us what happened?"

MRS. VARDAR: "Well, to start out with, Rob, it was one of those days; it certainly was. It was a dull cloudy day. It had been raining during the night - a light rain. It wasn't a very nice day to get up to when we finally did get up, that is. Everybody in the house picked that day to oversleep. Everyone rushing around and growling at each other, trying to make up lost time, wondering why the alarm clock didn't ring."

MODERATOR: "Well, that sounds like a typical household under the circumstances, but are these details important to the accident?"

MRS. VARDAR: "They are, Rob. Oh, yes, they definitely are."

MODERATOR: "All right then, go ahead."

MRS. VARDAR: "You see, because the alarm clock didn't ring was why Jimmy, he is our ten-year old boy, missed the school bus, and why I had to take him to school in the family car, and why I was out on the Piketon Highway that wet cold morning."

MODERATOR: "I see."

MRS. VARDAR: "Yes, and that rain during the night, that's also important. You see, it made the road wet, and oh yes, it was cold that morning - raw, nasty weather."

MODERATOR: "Now, by cold do you mean it was cold enough to freeze the water on the highway?"

MRS. VARDAR: "Well, not on the highway itself, or the pavement either. It had been nice and warm the day before. I suppose the heat in the ground kept the rain from freezing. But when I got on that bridge, the pavement then was all ice."

MODERATOR: "The bridge?"

MRS. VARDAR: "I guess I do have things out of order. I'll see if I can get them right. I had to take Jimmy to school. We live outside town on Piketon Highway, just moved out there. So country living is new to us. Anyway the pavement was wet, but not icy. Well, sir, about a mile north of our house is a bridge over the river. Now the pavement on that bridge looks just like the road I was on, but it certainly wasn't. I realized that the minute I got on it."

MODERATOR: "What was the difference, Mrs. Vardar?"

MRS. VARDAR: "It wasn't water on the bridge, Rob, it was a thin skim of ice - slick as glass. It must have been some freak breeze or something there. And then there was something else."

MODERATOR: "What was that?"

MRS. VARDAR: "A truck that had been coming toward me in the opposite direction. The minute I hit that ice on the bridge, I realized that big truck and my car would pass each other on the bridge. Now I had been driving about 35, the wet road, you know. And the truck wasn't quite to the bridge yet. The bridge wasn't very long. Oh, maybe 30 or 35 feet. So I thought maybe if I speeded up I could get off the bridge before the truck got on it. I thought it would be real dangerous if that truck and my car met on the bridge with the ice and all. Well, sir, I stepped on the gas, and what I was afraid of all along happened. My car skidded out on the ice on the bridge. The back end went around sideways to the left across the road and right in front of that truck. Well, that's it. The left rear side of my car got mashed in when the truck hit it. It seems to me that truck driver could have slowed down and waited until I got clear of that bridge. We all would have been a lot better off."

MODERATOR: "Thank you, Mrs. Vardar. Now listeners, let's turn to the truck driver, Dan Menden, for his account. Dan, it was your truck that struck Mrs. Vardar's car. Is there anything you would like to add?"

MENDEN: "Mrs. Vardar told it the way it happened. Sure my truck hit her car, when the back end of her car was clear over on my side of the road. You can't blame me for that."

MODERATOR: "What about Mrs. Vardar's point about that you should have waited until she had gotten clear of the bridge?"

MENDEN: "Look, Rob, if I have to slow down or stop every time another car comes along, I'd never get to the end of a run. That bridge was plenty wide enough for her car and my truck. It wasn't a narrow bridge so both of us couldn't get on it at the same time. Her car skidded right in front of my rig. That's what did it."

MODERATOR: "But you didn't realize that there might be ice on the bridge?"

MENDEN: "Sure I did, Rob. Well, this happened about 8:00 a.m. and I had been driving since 6:00 a.m. that morning. There had been ice patches other places, but I drove at a steady 45 and I didn't have any trouble controlling my rig. It seems to me that if folks can't handle their car in a case like that, they had just better stay at home."

MODERATOR: "Well, we have the facts. Now let's turn to our studio microphones for today's panel discussion. From the account you have just heard, make your decision. Were these drivers victims of bad weather conditions, or were human errors responsible for this collision. Make your decision."

CENTER ANALYSIS: "Center staff members who have reviewed today's case, the "Case of the Invisible Ice," agree with the opinion of today's panel. That it was Mrs. Vardar's faulty driving techniques that were the cause of the collision described. Mrs. Vardar admitted she feared meeting the oncoming truck on the icy bridge. To avoid this situation, which to her, at the time, appeared dangerous, she attempted to accelerate her car suddenly to get off the bridge before meeting the truck. She apparently had no realization that this sudden surge of power to her wheels might produce a skid on the part of her vehicle which was much more dangerous than meeting the truck on the bridge itself.

"Whether Mrs. Vardar lacked the necessary driving skills or whether her family's recent move the country confronted her with new and unfamiliar driving conditions, she apparently did not know that sudden acceleration of her vehicle on ice can cause a car to skid out of control. Just as needed traction is lost when the brakes are applied sharply and the wheels skid on ice, sudden acceleration causes complete loss of traction on ice. This is what happened to Mrs. Vardar in today's case and why her car went out of control.

"What should Mrs. Vardar have done under the circumstances? She should have maintained a straight course and held her speed constant. She should have avoided any sudden increase or decrease in speed and she should have avoided any sudden movement of the steering wheel. At her reported speed of about 35 mph, she should have been able to keep her car under control and continue ahead on her side of the road without any great difficulty.

"The truck driver, Dan Menden, had no advance warning of Mrs. Vardar's inability to control her car up until the actual skid itself. Mrs. Vardar's car gave no indication of impending trouble. Menden should have realized that less experienced drivers might meet difficulties on the icy bridge and could have slowed down to avoid meeting on the bridge. Beyond this, he did nothing to contribute to the collision. It was Mrs. Vardar's mistake of attempting to accelerate rapidly on ice that caused the skid, and that led directly to the collision described in today's case."

EVALUATION CRITERIA

CASE OF THE INVISIBLE ICE

Vardar (6)

1. Sudden acceleration will produce out of control skid. (2)
    - a. Accelerated suddenly on the bridge because she was afraid of meeting truck on bridge. (1) (Overlap with #1)
    - b. Should have maintained straight course and kept speed constant. (1) (Overlap with #1)
    - c. Lack of driving skill. (1)
    - d. New and unfamiliar driving conditions. (1)
    - e. Mental condition - household was late and disrupted. (1)
    - f. Lack of knowledge about the icy conditions on the bridge. (1)

Menden (4)

1. Could have slowed down to avoid meeting on bridge. (2) (No points for just slowing down.)
    - a. Should have realized that less experienced drivers might meet difficulties on icy bridge. (1)
    - b. His attitude toward the driving situation was aggressive. (1)

CASE OF THE BUSY INTERSECTION

MODERATOR: "Here is Hudson's complete account of what happened."

HUDSON: "I was driving north on Beldon Drive. It is a three-lane street; that's one-way going north. I was driving in the right-hand lane and there was a car following right behind mine, and it had been for several blocks. I was approaching the Fourth Street intersection, and there are traffic lights at that intersection. When I was some distance away, the light was red, and there was a car stopped waiting for the light to change. This car was in the lane to my left. My lane was clear ahead. I approached the light at 25 mph; that is the posted limit. The light turned green. The stopped car in the lane to my left got off to a slow start. I kept straight ahead at my original speed, and passed him on the right, and went on into the intersection. Then I saw that there was an elderly man in the crosswalk on the other side of the intersection. He was crossing Beldon Drive from the west side to the east side and was about in the center of the street. That meant he had to pass in front of my car. I slammed on my brakes, and probably could have stopped, but that car behind me slammed into the rear of my car. Pushed me right into the old man. I just knocked him down, and bowed him over. He wasn't hurt. You know, these guys who ride your bumper sure can cause a lot of trouble."

MODERATOR: "Well, there is Hugh Hudson's account of what happened at the intersection of Beldon Drive and Fourth Street. The car that was following Hudson was driven by Alvin Skoda. Mr. Skoda, Hudson pretty well puts the blame on you."

SKODA: "Well, I couldn't stop, if that's what he means; but I certainly wasn't doing anything unusual."

MODERATOR: "How do you mean that?"

SKODA: "Well, you know how it is in city traffic - you follow the traffic ahead, you expect the car ahead to keep moving, you stay in your own lane."

MODERATOR: "Well, didn't you see the stop light ahead?"

SKODA: "Well, sure I did, but I was in the same boat as this man Hudson was. I saw the light turn green, the same as he did. His car kept on going ahead and so did I. I certainly didn't expect him to stop in the middle of the intersection. I didn't have any warning at all."

MODERATOR: "Then you didn't see the pedestrian?"

SKODA: "Well, how could I. There were two cars ahead of mine - Hudson's car in my lane, and the other car in the lane to the left of mine. You can't expect me to see through them all, can you?"

MODERATOR: "And that's Alvin Skoda's story. He's the driver of the second car who couldn't stop and who bumped Hudson's car from the rear and pushed it into the pedestrian. The other person was the walker. His name is Ralph Dover."

DOVER: "I'm Ralph Dover, and I am pretty lucky, I guess, that I didn't get hit any harder. I tried to get out of the way, but I guess I am not as spry as I used to be."

MODERATOR: "Now, Mr. Dover, when you started to cross the street, what color was your light?"

DOVER: "Green, I wasn't jaywalking, if that is what you mean. The light was green, so I started across. I wasn't quite halfway across when the light changed to yellow and then to red. I though I could get across without any trouble. Had a perfect right to, you know."

MODERATOR: "But you didn't see those other cars coming?"

DOVER: "Well, I started across and I looked and there was one car on the other side of the intersection stopped waiting for the light. You know, when the light changed on me and I looked up again and saw all those cars coming at me, that intersection sure looked awful busy all of a sudden."

MODERATOR: "And there are the facts in the 'Case of the Busy Intersection.' All of the persons involved were acting quite normally in traffic. That is, doing those things most of us as drivers and walkers do under similar circumstances. Yet, for these persons, these driving and walking habits spelled a two-way collision - a rear-end collision between two cars and a second collision between the first car and the walker. Who had primary responsibility? Who had the best chance to avoid this situation?"

CENTER ANALYSIS: "Highway Traffic Safety Staff Members who have reviewed this case place the primary responsibility for this mishap on Hudson, the driver of the car who tried to stop, was hit from behind, and was shoved into the pedestrian. He made two important errors which led to this collision, and here is what they were.

"First, Hudson failed to slow down in approaching the stop light and the intersection. Had he slowed down gradually ahead of the intersection, Skoda would have been forced to slow down or go on around Hudson's car. Hudson admits knowing Skoda was too close behind him for some distance, and yet he took no measures to protect himself against the rear-end collision in the event he had to stop suddenly. Now also Hudson should have slowed down in approaching the intersection because even though the light turned green, he did not have the right-of-way. When a green light comes on, you have the right-of-way only after the intersection is cleared by vehicles or pedestrians legally in the intersection when the light changed. Now Hudson saw his light change to green and went on at his original speed without any regard as to whether or not the intersection was clear.

"Hudson's second dangerous error was in the estimation of his ability to stop. His admitted speed was 25 mph. Now he also admitted not seeing Dover, the pedestrian, until his car was in the intersection. Now from a speed of 25 mph, the average stopping distance is about 67 feet. And since Hudson was in the intersection before he saw the walker on the opposite crosswalk, and since he needed at least a stopping distance of some 67 feet, the chances were against his being able to stop before reaching the pedestrian even without the shove from behind from Skoda's car. Hudson's speed was too great. He took the right-of-way when it actually wasn't his. He must accept responsibility for the mishap. However, Skoda was following too closely, was unable to stop in the insured distance ahead, and had failed to adjust his speed to conditions. Dover started to walk across the street apparently with no idea of how much time he had left before the light changed, and he might have shown better judgment had he returned to the curb rather than continuing on across. These acts all contributed to the situation. However, Hudson's errors are the mistakes that changed a dangerous situation into a collision."

EVALUATION CRITERIA

CASE OF THE BUSY INTERSECTION

Hudson (8)

1. Failed to slow down in approaching the intersection. (2)
    a. Took no measures to protect himself knowing full well that Skoda was following too closely. (1)
2. Estimation of his ability to stop. (2)
3. Even though he had a green light, he did not have the right-of-way. (2) (Refers to intersection.)
    a. Hudson took right-of-way when it wasn't his. He did not properly check the crosswalks for pedestrians. (1)

Skoda (4)

1. Following too closely. (2)
    a. Failed to adjust speed. (1)
    b. He did not consider the possible actions of others - defensive driving practices. (1)

Dover (2)

a. Did not ascertain how much time he had left on light. (1)

b. Dover should have exercised better judgment and returned to the curb. (1)

APPENDIX D

Instructional Treatment Groups

Number of Students

Teaching Experience

Instructor Assignments

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

INSTRUCTIONAL TREATMENT GROUPS

	FOUR-PHASE PROGRAM **A** Laboratory Groups 20, 21, 22, 23	STANDARD PROGRAM **B** Laboratory Groups 24, 25, 26	SIMULATOR PROGRAM **C** Laboratory Groups 28, 29, 30, 31	RANGE PROGRAM **D** Laboratory Groups 32, 33, 34, 35
30 hours Classroom Program **1** Classroom Groups 14, 17	**1**	**4**	**7**	**10**
30 hours Classroom plus 15 hours Drivocator Program **2** Classroom Groups 15, 18	**2**	**5**	**8**	**11**
45 hours Classroom Program **3** Classroom Groups 16, 19	**3**	**6**	**9**	**12**

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

NUMBER OF STUDENTS IN DIFFERENT INSTRUCTIONAL TREATMENT GROUPS

PROGRAMS	SEX	FOUR-PHASE **A**	STANDARD **B**	SIMULATOR **C**	RANGE **D**	SUB-TOTAL	TOTAL
30 hour **1** Classroom	M	40 **1**	35 **4**	31 **7**	33 **10**	139	268
	F	33	35	31	30	129	
30 hour Classroom **2** + 15 hour Drivocator	M	32 **2**	34 **5**	32 **8**	24 **11**	122	259
	F	31	36	32	38	137	
45 hour **3** Classroom	M	43 **3**	37 **6**	33 **9**	28 **12**	141	274
	F	31	34	37	31	133	
SUB-TOTAL	M	115	106	96	85	402	-
	F	95	105	100	99	399	-
TOTAL		210	211	196	184	-	801

TEACHING EXPERIENCE OF DRIVER EDUCATION INSTRUCTORS

Instructors	Total Years Driver Training	Total Years Teaching
Eugene B. Bryan	2	4
Don M. Carnahan	4	5
Harold Conley	16	17
Virgil Gross	5	20
F. Joseph Koenig	19	40
Jerry C. McVay	2 months (summer school)	5
Helmer Paulson	1	17
Lloyd R. Riddle	3	9
Eric Roberts	-	7
Larry E. Schwitters	-	5
Robert L. Smith	8 (summer school)	25
Gordon Wingard	22	24
Robert Wraith	-	9

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

TEACHER SCHEDULES - CLASSROOM, SIMULATOR, RANGE

PERIODS	1	2	3	4	5	6
Group 14 30	Roberts	Carnahan	Koenig	Gross	Smith (Gross)*	Roberts
Group 15 30+15	Koenig	Gross	Roberts	Roberts	Carnahan	Smith (Koenig)
Group 16 45	Gross	Koenig	Gross	Smith (Munson)	Roberts	Carnahan
Group 17 30	Roberts	Carnahan	Koenig	Gross	Smith (Gross)	Roberts
Group 18 30+15	Koenig	Gross	Gross	Roberts	Carnahan	Smith (Koenig)
Group 19 45	Gross	Koenig	Roberts	Smith (Munson)	Roberts	Carnahan
Simulator Aetna	Wraith	Wraith	Wraith	Bryan	Bryan	Bryan
Simulator Allstate	Smith (Munson & Schwitters)	Smith (Munson & Schwitters)	Smith (Schwitters)	Schwitters	Schwitters	Schwitters
Range	Riddle	Riddle	Carnahan	Carnahan	Munson	Munson

*Teachers in parentheses replaced Mr. Smith in these classes.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

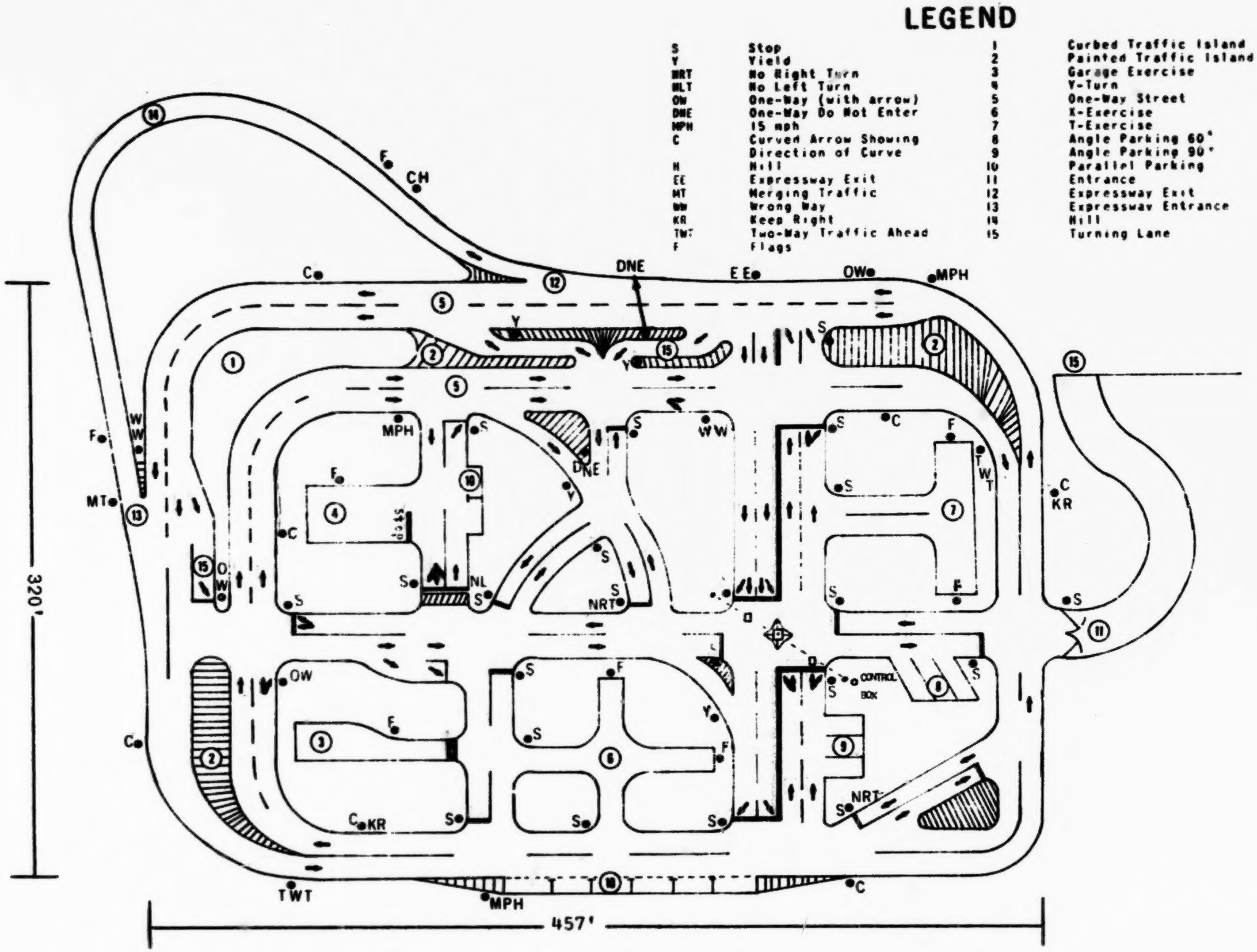
ON-STREET INSTRUCTOR ASSIGNMENTS

Instructors	Laboratory Groups 20-23	Laboratory Groups 24-26	Laboratory Groups 28-31	Laboratory Groups 32-35
Eugene B. Bryan	3	8	6	10
Don M. Carnahan	5	1	0	2
Harold Conley	10	11	14	6
Virgil Gross	3	2	2	2
F. Joseph Koenig	6	3	4	5
Jerry C. McVay	10	10	12	9
Helmer Paulson	6	6	6	6
Lloyd R. Riddle	11	6	7	7
Eric Roberts	3	0	0	1
Larry E. Schwitters	6	7	5	10
Gordon Wingard	3	15	10	7
Robert Wraith	8	7	7	7

APPENDIX E

Range Drawing

Range Discipline



LEGEND

S	Stop	1	Curbed Traffic Island
Y	Yield	2	Painted Traffic Island
NRT	No Right Turn	3	Garage Exercise
NLT	No Left Turn	4	Y-Turn
OW	One-Way (with arrow)	5	One-Way Street
DNE	One-Way Do Not Enter	6	X-Exercise
MPH	15 mph	7	T-Exercise
C	Curved Arrow Showing Direction of Curve	8	Angle Parking 60°
		9	Angle Parking 90°
H	Hill	10	Parallel Parking
EE	Expressway Exit	11	Entrance
MT	Merging Traffic	12	Expressway Exit
WW	Wrong Way	13	Expressway Entrance
KR	Keep Right	14	Hill
TWT	Two-Way Traffic Ahead	15	Turning Lane
F	Flags		

MULTIPLE CAR OFF-STREET DRIVING RANGE
RENTON SCHOOL DISTRICT #403
RENTON, WASHINGTON

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

OFF-STREET MULTIPLE CAR DRIVING RANGE DISCIPLINE

1. Students must report promptly to the bus loading area at assigned periods.
2. Students will enter cars only upon signal from the instructor.
3. Always know the number of the car you are driving.
4. Students should always report to the same numbered car each lesson.
5. The car radio is to be used only for communication from the instructor - do not adjust.
6. No student will start or move the car until directed by the instructor.
7. The speed limit on the range will be a maximum of 15 mph until changed by the instructor.
8. When following another car, remain at least three car lengths behind the car ahead.
9. There will be no passing except as directed by the instructor.
10. When driving, do not turn head to look at the teacher or at the radio receiver.
11. Once you have received instructions in an area, you are free to enter that area if it is not occupied.
12. Drivers will not change until told to do so by the instructor.
13. In the event of a possible accident or collision, the passenger should always apply the dual control brake.
14. At the close of the period, the driver will park as instructed and leave the key in the right outside door lock.
15. Books and personal possessions are not to be left on bus or in cars.
16. Pay attention to the instructor and do only as you are instructed.
17. Eating or drinking is not allowed in the cars.
18. There is to be no idle conversation while driving.

19. Keep both hands on the steering wheel, except when signaling or backing.

20. You are to always enter and exit from the curb side.

21. The driver shall always observe the proper pre-ignition and starting procedures on the range.

22. When backing, always follow proper backing procedures - do not look forward until car comes to a complete stop.

23. Be alert - Watch the car in front of you - Signal whenever you stop.

24. Directional signals will be used on all turns until directed by the instructor to use manual signals.

25. Be sure to watch your warning lights and temperature gauge.

26. If you become confused, give stop signal, go through stopping and securing procedures, and consult with the instructor.

27. Before leaving car, go through the proper stopping and securing procedures.

APPENDIX F

Meeting Driving Emergencies

Traffic Accident Information

Instructors and Per Pupil Costs

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

MEETING DRIVING EMERGENCIES

1. Brakes Fail

Take foot off accelerator pedal.

Pump brake pedal repeatedly.

Engage parking brake.

Shift to lower gear.

Sound horn.

Rub tire against curbing, if on a steep city hill.

Rub fender against cliff or run into bushes before picking up speed, if on a mountain road.

When driving on median divided highways and expressways, steer off right side of the road if traveling in right lane.

Steer onto median strip if traveling in left lane.

If traveling in middle lane, move to the safest side depending on traffic and roadway conditions.

When driving on a two-lane highway, steer off the right side of the road, avoiding fixed objects and steep drop-offs.

2. Running off Pavement

Release accelerator pedal.

Keep firm grip on steering wheel.

Resist urge to return to pavement immediately.

Straddle pavement edge until car is moving slowly.

Turn sharply back onto pavement where pavement is nearly level with shoulder.

3. Tire Blows Out

Keep firm grip on steering wheel.

Keep wheels as straight as possible.

Gradually release accelerator pedal.

Pump brakes lightly.

Reduce speed to 15 mph or less before pulling off onto shoulder.

Have car well off the road to change tire.

If car starts to skid, steer in the direction of the skid. There is more of a chance of a skid if the rear tire blows out.

4. Gas Pedal Sticks

Shift to neutral.

Pump accelerator pedal with several sharp jabs to release.

Apply brakes and pull off highway.

5. Recovering from a Skid

Avoid braking unless absolutely necessary.

Steer in the direction in which the rear end of the car is skidding.

Do not oversteer in direction of skid.

Anticipate counter skid.

Straighten front wheels, when car begins to straighten.

6. Blinding Lights

Dim lights, even though other driver does not.

Look at right edge of road.

Slow down.

Pull to the right in order to give other driver room.

7. Lights Fail

Try other lights - high or low beam, turning signal, parking lights, fog lights, brake lights.

Pull off road and stop.

8. Flooding of Carburetor

Hold accelerator pedal against floor. (Do not pump pedal!)

Engage starter for twenty to thirty seconds; repeat if necessary.

If car does not start after above procedure, turn ignition off and wait for ten minutes before attempting to start car.

9. Vapor Lock

Vapor locks are caused by an overheating of the car and high altitude.

Pull off highway at a safe place.

Wrap a cool wet cloth around carburetor for ten minutes. Remove wet cloth before attempting to restart automobile.

10. Stalling on Railroad Tracks

If train in not coming, try to restart car.

If train is coming, leave car.

Leave area of impact; do not go in direction train is going.

If train is not coming and car will not restart, place in neutral and push.

11. Animals and Objects on the Road

Avoid hitting animal only if you can safely do so by braking and steering, but do not swerve so drastically as to lose control - better to strike the animal.

Check mirror.

Do not brake hard enough to lock wheels.

Braking should not be abrupt enough to cause a rear-end collision.

12. Deep Ruts and/or Holes in Road

Reduce speed.

Try to avoid.

Before wheel drops in rut or hole, straighten wheels and let up on brakes so wheels will turn.

Maintain firm grip on steering wheel.

13. Hood Flies Up

Look ahead out of left window or through between car and the hood.

Reduce speed by pumping brakes.

Pull off road as soon as possible.

Center line of roadway may serve as a reference point for staying in the correct lane.

14. Steering Failure

Hard steering - pull off road and check for low tire or broken power steering belt.

Complete failure - apply brakes moderately to prevent skidding.

15. Car Catches on Fire

Carry fire extinguisher - dry chemical is best.

Check fire extinguisher periodically for proper charge.

Throw mud, dirt, water, or snow on blaze.

If fuel or electrical blaze - do not use snow or water to extinguish.

Hub cap can be used to carry water from ditch or stream.

16. Bee in Car

Ignore while driving.

Pull over and stop safely before removing bee.

17. Physical Emergencies Affecting the Driver

Dirt in eye - violent coughing or sneezing attack - signal, slow down, and stop, until condition is corrected.

Dropped articles - lighted cigarettes, etc. - do not try to retrieve anything from floor of car while car is moving. Stop - then recover or dispose of dropped items.

Grabbing for falling articles, shopping bags, small children, etc. - children, large bags, and bundles should be securely fastened into the passenger seats with seatbelts - to make such grabbing totally unnecessary.

Loss of driver consciousness - passenger in front seat should move to center of seat - take steering wheel and apply necessary brake pressure with left foot to bring car to a safe stop off the road. This may necessitate removing driver's foot from accelerator pedal.

Passenger in rear seat who must assume control of vehicle - reach over back of front seat and take steering wheel and shift to neutral if driver's foot in on accelerator and creates a hazard. Shift to neutral before climbing over back of front seat. After assuming position in front seat next to the driver, apply necessary braking pressure and steer safely off the road to a smooth stop.

18. Rear-End Collision Imminent

Straighten wheels.

Grasp steering wheel firmly.

Throw yourself across front seat or slump down so your head is supported by back of front seat or head rest.

Each person in car should have seatbelts securely fastened - shoulder and lap belt combination is safest.

19. When an Accident is Imminent

Steer until accident is unavoidalbe.

Stay in car.

Driver cross arms over face and press head and arms against dash or steering wheel.

Front seat passengers cross arms over face and press head and arms against dash.

Rear seat passengers cross arms over face and press head and arms against back of front seat.

If unable to press head and arms against dash or back of front seat, press head against back of seat or headrest.

Each person in car should have seatbelts securely fastened.

20. Car Approaching Head-On in Your Lane

Anticipate this situation where visibility is limited, i.e., sharp curves, crest of hills, tunnels, adverse weather, or at night.

This situation is generally overcome by steering around the traffic conflict.

This situation generally calls for a light to medium brake, if any.

Reduce speed.

Steer toward right side of road - if necessary leave roadway to avoid collision.

Avoid fixed objects or steep drop-offs.

21. Car Attempting to Pass You Is Unable to Complete Pass Safely Because of On-Coming Traffic

If car is even with you and accelerates, you should brake safety and if necessary steer right.

If car is even with you and brakes, you should accelerate.

If car is past you, you should brake safely and if necessary steer right.

If car is behind you, you should accelerate.

22. Submerged Car

Escape through open windows, before water reaches window level, if possible. Most cars will float for several minutes.

If car sinks too rapidly, move to portion of passenger compartment nearest to the surface.

Open side window or knock out windshield or back window, whichever is nearest to the surface.

A heavy sharp pointed object, such as a nail punch, chisel, or spiked nail, can be helpful in breaking out rear window or windshield.

23. Driving on Snow and Ice

Drive at reduced speed.

300

Make no sudden changes in speed or direction.

Whenever possible, steer around an object instead of braking to avoid the object.

To slow down, apply a light steady pressure on the brake pedal. If distance permits, pumping the brake pedal lightly two or three times per second is permissible.

Do not lock brakes.

Plan ahead to avoid sudden stops or lane changes.

Turn on defrosters when windows or windshield start to accumulate fog. This condition indicates need for circulation of air inside automobile.

Periodically check and remove ice, mud, and slush from wheel wells, lights, and car windows.

Carry tire chains in car when anticipating driving in snow or icy conditions. Put chains on rear wheels when driving on compact snow and ice, when your tires start losing traction. Use chains at all times when "chains required" signs are displayed.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

TRAFFIC ACCIDENT INFORMATION
Furnished Red Cross by State Patrol

First Aid

In cooperation with the State Patrol, the following information undoubtedly will assist in clarification of WHAT TO DO and/or WHAT NOT TO DO on the State of Washington Highways in case you are involved in an accident or come upon an accident.

(Q) Under what circumstances is a person obligated to stop and render assistance when he comes upon an accident?

(A) It is always a moral obligation to render assistance to anyone in distress; but, unless you are involved in an accident, it is not mandatory that you stop.

- - - -

(Q) If you see an accident happen, what should you do?

(A) Render assistance to the best of your ability. Either stay at scene of the accident until an officer arrives or make yourself available for a witness report. If you must leave, give someone your name and address.

- - - -

(Q) What is the first move you should make if you do stop?

(A) Make a quick survey of all circumstances while protecting yourself. If at night and you have flares or reflectors, put them out. If there is more than one person in your car and you do not need them to help you, send them to the nearest telephone to notify the local police agency.

- - - -

(Q) Should a traveler take it upon himself to call an ambulance or a doctor?

(A) It is much better to have the local police agency that you call summon the ambulance and/or a doctor.

- - - -

(Q) Could a traveler be charged with the ambulance costs if the injured person refused to pay for the ambulance service?

(A) Ordinary circumstances, no; but if the ambulance owner pressed charges to collect, that would rest with the authorities.

(Q) If someone is seriously injured in an accident, should you immediately start administering First Aid?

(A) No. If the person is conscious, offer to assist and ask the person if he desires your assistance. If you have your First Aid card in your possession, show it to him.

- - - -

(Q) If the person refuses your assistance, can you administer First Aid regardless of his refusal?

(A) No. Try to persuade him you can help, but if he still refuses to accept your assistance, do not touch him.

- - - -

(Q) What if the victim is on the highway right-of-way in the line of traffic? Can you move him out of the traffic lane regardless of his refusal?

(A) No. Detail yourself as a traffic officer and direct traffic around him.

- - - -

(Q) If the injured person is unconscious, then what procedure should you follow?

(A) If there are any more people in the vehicle or vehicles involved, ask if there are any blood relatives present. A blood relative and only a blood relative can speak for an unconscious person.

- - - -

(Q) If a blood relative (husband or wife), (mother or father), (sister or brother of legal age), (son or daughter of legal age) is present; must we obey their decision?

(A) Yes. The same as the person themselves if the person was conscious.

- - - -

(Q) If no blood relative is present, then what procedure should you follow in regard to the unconscious person?

(A) Perform First Aid to the best of your knowledge and ability with whatever material is available. If you are a trained First Aider, do as you were taught in your First Aid course.

- - - -

(Q) If you move a person off the highway, what must you do?

(A) Mark the spot in some manner where and how he is lying.

(Q) If the accident happens in an isolated place where you consider the time lost by waiting for an officer or an ambulance would decrease the chance of survival of the person, would you be exposing yourself to a lawsuit if you transported the person in your private car?

(A) Injured people should be transported only in ambulance or authorized police carriers. If you should happen to have an accident while transporting an injured person, you could run the risk of being charged with negligence.

- - - -

(Q) What if the injured person asks you to transport him to medical assistance?

(A) Then you are transporting him under his authorization.

- - - -

(Q) If, while you are rendering assistance, an officer arrives and orders you to stop your assistance; must you obey his orders?

(A) Yes, but explain to the officer that when he takes charge he is also responsible for all future happenings.

- - - -

(Q) If the injured person dies while you are administering assistance, could the relatives sue you?

(A) It would be possible, but I know of no case in Washington History where any judgment has been rendered against a person who performed First Aid as he was taught in his First Aid course.

- - - -

(Q) If you do stop at an accident and render any assistance to an injured person, what must you do?

(A) Either stay at the scene of the accident until a law enforcement officer arrives or report to some law enforcement agency so a report can be recorded. Be sure a flagman is set to avoid further accidents.

- - - -

The intent of the foregoing is not to make people dubious about stopping and rendering assistance to a victim of circumstances, but an attempt to clarify many requests involved in a lawsuit if you should administer First Aid on the Highways of the State of Washington.

WASHINGTON TRAFFIC SAFETY EDUCATION PROJECT

INSTRUCTORS AND PER PUPIL COSTS FOR DIFFERENT LABORATORY PROGRAMS

The following paragraph contains a statement of the factors used to make a comparison of instructional costs per pupil among four types of laboratory programs as reported in Chapter V, pp. 154-156.

Students in each program will receive forty-five class hours of classroom instruction and varying amounts of laboratory experience. Each program will extend over a one-semester period of time. Each class session will be fifty-five minutes in length. Groups of twelve students each will receive simulator and range instruction. One student will be in the car on the range. Three students will be in the car in the on-street phase of instruction. Each program will have the classroom and laboratory instruction correlated and integrated. Each student will receive at least three days of classroom instruction prior to any type of laboratory experience. The per pupil cost is based on a salary of $8,000.00 per instructor. The automobile, insurance, and other operating expenses will vary between school districts, so this cost would have to be added to the instructor's salary to determine the total cost per pupil. However, the operating expenses should vary very little between the different laboratory programs, with the greatest difference being between the standard and simulator programs.

APPENDIX G

Supplemental Analysis - Post-Test for Driving Knowledge

Supplemental Analysis - Post-Test for Driving Knowledge

The means and standard deviations of scores on the supplemental analysis of the Post-Test for Driving Knowledge[1] are recorded below for the four laboratory programs (Table A), the three classroom programs (Table B), and for each sex (Table C).

TABLE A

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE POST-TEST FOR DRIVING KNOWLEDGE AMONG THE FOUR LABORATORY PROGRAMS*

Laboratory Program	N	Mean	Unweighted Mean	Standard Deviation
Four-Phase	208	54.12	53.978	4.698
Standard	209	53.96	53.942	4.652
Simulator	195	54.43	54.440	4.541
Range	184	54.52	54.513	4.151

*Supplemental analysis without the extreme scores.

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[1] National Test in Driver Education (Special Form; New York New York University, Center for Safety Education, 1967).

TABLE B

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE POST-TEST FOR DRIVING KNOWLEDGE AMONG THE THREE CLASSROOM PROGRAMS*

Classroom Program	N	Mean	Unweighted Mean	Standard Deviation
30 hour Classroom	268	54.03	53.995	4.479
30 hour Classroom plus 15 hour Drivocator	257	54.88	54.921	4.287
45 hour Classroom	271	53.86	53.738	4.732

*Supplemental analysis without the extreme scores.

TABLE C

MEANS AND STANDARD DEVIATIONS OF SCORES ON THE POST-TEST FOR DRIVING KNOWLEDGE BETWEEN FEMALE AND MALE STUDENTS*

Sex	N	Mean	Unweighted Mean	Standard Deviation
Female	394	53.36	53.342	4.490
Male	402	55.11	55.094	4.392

*Supplemental analysis without the extreme scores.

A three-way factorial (4 X 3 X 2) unweighted means analysis of variance was used to test the null hypotheses that no significant differences would probably exist among the mean scores attained by students assigned to one of four laboratory programs, one of three classroom programs, or between female and male students. The computed value of F (Table D) for the laboratory program was less than the critical value of F. Therefore, the null hypothesis of no difference among the four laboratory programs was accepted at the .05 level of significance.

The computed value of F (Table D) for the difference among mean scores of students assigned to one of three classroom groups is greater than the critical value (F at the .01 level = 4.64) of F (Table D). Therefore, the null hypothesis of no difference is rejected at the .01 level of significance.

The computed value of F (Table D) for the difference between mean score attained by female and male students is greater than the critical value (F at the .001 level = 10.83) of F (Table D). Therefore, the null hypothesis of no difference was rejected at the .001 level of significance, with the male student having a higher mean score than the female student.

A significant interaction at the .05 level of confidence did exist both in the two-way interaction between classroom and sex and in the three-way interaction between laboratory, classroom, and sex (Table D). An inspection of mean scores (Table E) in the two-way interaction indicates that the difference between female and male students is less in the drivocator group than the thirty hour or forty-five hour classroom groups. This may suggest that the drivocator or multi-media approach to instruction benefits female students more than male students.

An inspection of mean scores in the three-way interaction between classroom, laboratory, and sex did not produce any viable explanation for this interaction. As McNemar points out, "interaction, [is] a concept which is not easily understood."[2]

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[2] Quinn McNemar, Psychological Statistics (Third Edition; New York: John Wiley and Sons, Inc., 1962), p. 290.

TABLE D

ANALYSIS OF VARIANCE, POST-TEST FOR DRIVING KNOWLEDGE*

	Sum or Squares	Degree of Freedom	Mean Square	Computed Value of F	Critical Value of F(.05)	Significance
Laboratory	1.6218	3	.5406	<1		no
Sex	18.4100	1	18.4100	31.3201	3.86	.001
Classroom	6.1917	2	3.0959	5.2669	3.02	.01
Classroom X Laboratory	2.6833	6	.4472	<1		no
Classroom X Sex	3.7363	2	1.8682	3.1782	3.02	.05
Laboratory X Sex	1.4567	3	.4856	<1		no
3-Way Interaction	9.2927	6	1.5488	2.6349	2.11	.05
Within Cells		772	.5878			
		795				

*Supplemental analysis without the extreme scores.

TABLE E

MEAN SCORES IN THE TWO-WAY INTERACTION BETWEEN CLASSROOM AND SEX*

Classroom Program	Female	Male
30 hour Classroom	52.67	55.32
30 hour Classroom plus 15 hour Drivocator	54.55	55.29
45 hour Classroom	52.80	54.67

*Supplemental analysis without the extreme scores.

Scheffé's Test for Multiple Comparisons[3] was applied to isolate the classroom programs having significant differences. The analysis without the five extreme scores, all female students, produced significance at the .01 level of confidence between the thirty hour classroom plus fifteen hour drivocator program and the forty-five hour classroom program in favor of the thirty hour classroom plus fifteen hour drivocator program (Table F). Significance at the .10 level of confidence was also found between the thirty hour classroom plus fifteen hour drivocator program and the thirty hour classroom program in favor of the thirty hour classroom plus fifteen hour drivocator program (Table F).

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[3] Allen L. Edwards, Experimental Design in Psychological Research (Revised Edition; New York: Holt, Rinehart, and Winston, May, 1962), pp. 154-156.

TABLE F

SCHEFFE'S TEST FOR MULTIPLE COMPARISONS, POST-TEST SCORES FOR DRIVING KNOWLEDGE - CLASSROOM PROGRAMS*

Classroom Program	Unweighted Mean	Comparisons C_1	C_2
30 hour Classroom	53.995	0	-1
30 hour Classroom plus 15 hour Drivocator	54.921	+1	+1
45 hour Classroom	53.738	-1	0
d_i =		1.183	.926
Σa^2 =		2	2
S_{d_i} =		.3834	.3834
t =		3.0855	2.4152

Mean Square Error = .5878 N = 8
Critical Value of t (at the .05 level) = 2.458
Critical Value of t (at the .01 level) = 3.046
Critical value of t (at the .10 level) = 2.168

*Supplemental analysis without the extreme scores.